Chapter 4

Air Basin Trends and Forecasts -- Criteria Pollutants

Introduction

This chapter includes information about criteria pollutant emission and air quality trends in California's five most populated air basins: the South Coast Air Basin, the San Francisco Bay Area Air Basin, the San Joaquin Valley Air Basin, the San Diego Air Basin, and the Sacramento Valley Air Basin. The primary focus of the chapter is ozone, PM_{10}, and carbon monoxide. However, information on nitrogen dioxide is included for the South Coast Air Basin and San Diego Air Basin because these areas were once designated as nonattainment for NO_2. Both of these areas now attain the nitrogen dioxide standards.

The introduction section for each air basin includes a description of the area, a discussion of the emission trends and forecasts for each pollutant, and a description of the changes in population and the number of vehicle miles traveled each day in the air basin. This introduction is followed by more detailed discussions of trends and forecasts in emissions by major source categories and trends in ambient air quality, organized by pollutant.

South Coast Air Basin

Introduction - Area Description

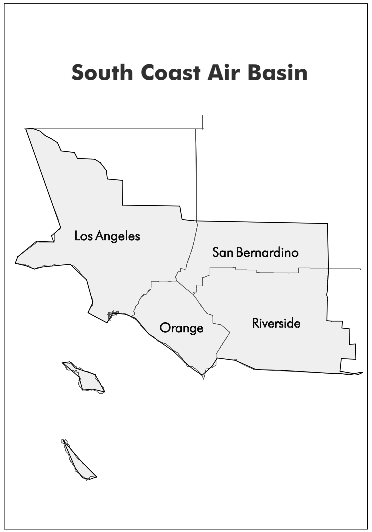

Figure 4-1

The South Coast Air Basin is California's largest metropolitan region. The area includes the southern two-thirds of Los Angeles County, all of Orange County, and the western urbanized portions of Riverside and San Bernardino counties. It covers a total of 6,729 square miles, is home to more than 40 percent of California's population, and generates about 30 percent of the State's total criteria pollutant emissions. The South Coast Air Basin generally forms a lowland plain, bounded by the Pacific Ocean on the west and by mountains on the other three sides. In terms of air pollution potential, there are probably few areas less suited for urban development. The warm sunny weather associated with a persistent high pressure system is conducive to the formation of ozone, commonly referred to as "smog." The problem is further aggravated by the surrounding mountains, frequent low inversion heights, and stagnant air conditions. All of these factors act together to trap pollutants in the air basin. Pollutant concentrations in parts of the South Coast Air Basin are among the highest in California. As a result, controlling the contributing emission sources poses a great challenge to State and local air pollution control agencies.

South Coast Air Basin

Emission Trends and Forecasts

Overall, since 1975 the emission levels for CO and the ozone precursors NO_x and ROG have been decreasing in the South Coast Air Basin and are projected to continue decreasing through 2010. The decreases are predominantly due to motor vehicle controls and reductions in evaporative emissions. In the South Coast Air Basin, on-road motor vehicles are the largest contributors to CO, NO_x, and ROG emissions. Other mobile sources are also significant contributors to CO and NO_x emissions. State Implementation Plan (SIP) and conformity inventory forecasts may differ from the forecasts presented in this almanac. For more information on these forecasts, please see the ARB SIP web page at *www.arb.ca.gov/sip/siprev1.htm*.

South Coast Air Basin

Population and VMT

Both population and the daily number of vehicle miles traveled, or VMT, grew at high rates in the South Coast Air Basin from 1981 to 2000. The population increased 34 percent -- from about 11.1 million in 1981 to almost 14.9 million in 2000. During the same general period, the number of vehicle miles traveled each day increased about 84 percent -- from 171 million miles per day in 1981 to more than 315 million miles per day in 2000. While high growth rates are often associated with corresponding increases in emissions and pollutant concentrations, aggressive emission control programs in the South Coast Air Basin have resulted in emission decreases and a continuing improvement in air quality.

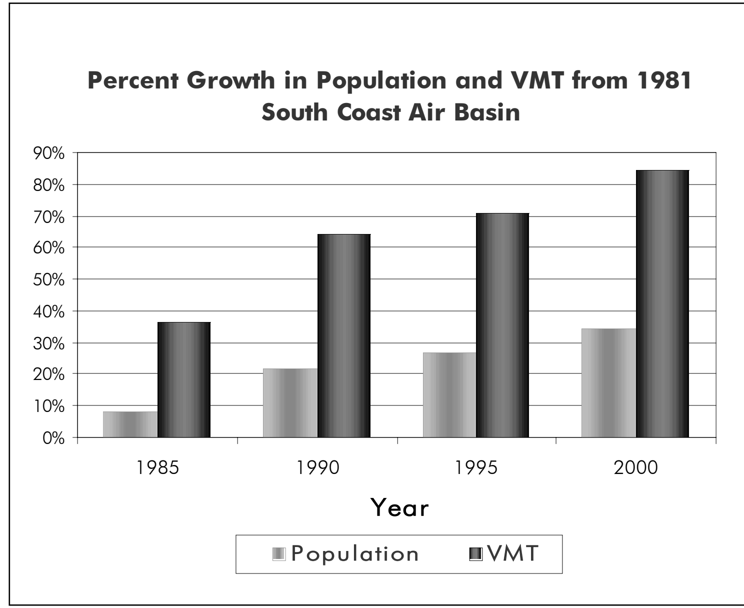

Figure 4-2

South Coast Air Basin

Ozone Precursor Emission Trends and Forecasts

Emissions of the ozone precursors NO_x and ROG in the South Coast Air Basin are generally following the statewide downward trend. Motor vehicle miles traveled in the basin are increasing, but NO_x and ROG emissions from on-road vehicles are dropping as more stringent vehicle emission standards have been adopted. These decreases in NO_x and ROG emissions are projected to continue between 2000 and 2010, as even more stringent motor vehicle standards are implemented and as newer, lower-emitting vehicles become a larger percentage of the fleet. NO_x emissions from electric utilities in the air basin have declined substantially since 1975, despite a nationwide increase in emissions from electric utilities in the same time period. These large reductions are primarily due to increased use of natural gas as the principal fuel for power plants, and control rules that limit NO_x emissions.

NO_x Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***1751***	***1708***	***1801***	***1638***	***1339***	***1101***	***864***	***680***
Stationary Sources	383	361	323	182	136	98	73	74
Area-wide Sources	33	36	37	30	29	32	35	29
On-Road Mobile	991	945	1087	1063	875	679	490	351
Gasoline Vehicles	911	791	819	711	610	440	278	192
Diesel Vehicles	80	153	268	352	265	239	212	159
Other Mobile	344	366	354	364	299	292	267	226

Table 4-1

ROG Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***2517***	***2185***	***2160***	***1696***	***1309***	***1003***	***741***	***632***
Stationary Sources	501	420	432	404	253	186	145	159
Area-wide Sources	211	231	255	227	205	200	177	168
On-Road Mobile	1675	1396	1324	900	676	470	320	227
Gasoline Vehicles	1670	1386	1309	883	664	460	311	220
Diesel Vehicles	5	9	15	16	12	10	9	7
Other Mobile	130	138	150	166	175	148	98	78

Table 4-2

South Coast Air Basin
Ozone Precursor Emission Trends and Forecasts

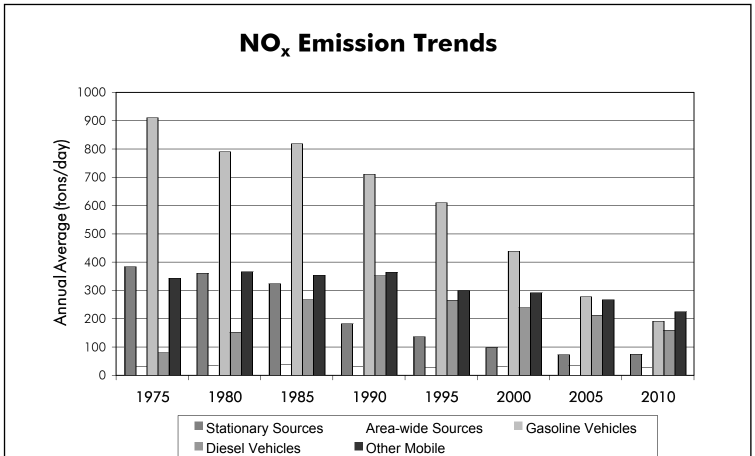

Figure 4-3

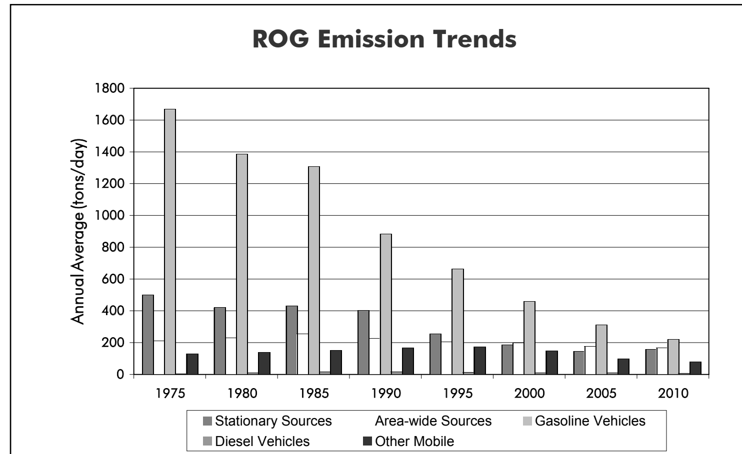

Figure 4-4

South Coast Air Basin

Ozone Air Quality Trend

Air quality as it relates to ozone in the South Coast Air Basin has improved substantially over the last 30 years. During the 1960s, maximum 1-hour concentrations were above 0.60 parts per million. Today, the maximum measured concentrations are less than one-third of that. All of the ozone statistics show a steady decline. The 2000 peak 1-hour indicator value is nearly 50 percent lower than the 1981 value. The maximum 1-hour concentration has decreased by more than 50 percent. The number of days above the standards has declined dramatically, as have the number of episode days. Stage I and Stage II episodes occur when a 1-hour concentration reaches 0.20 ppm and 0.35 ppm, respectively. The last Stage II episode occurred in 1988. While Stage I episodes could still occur, the number has been reduced from close to 100 during the early 1980s to only 1 during 1997, 11 during 1998, and 0 in 1999 and 2000.

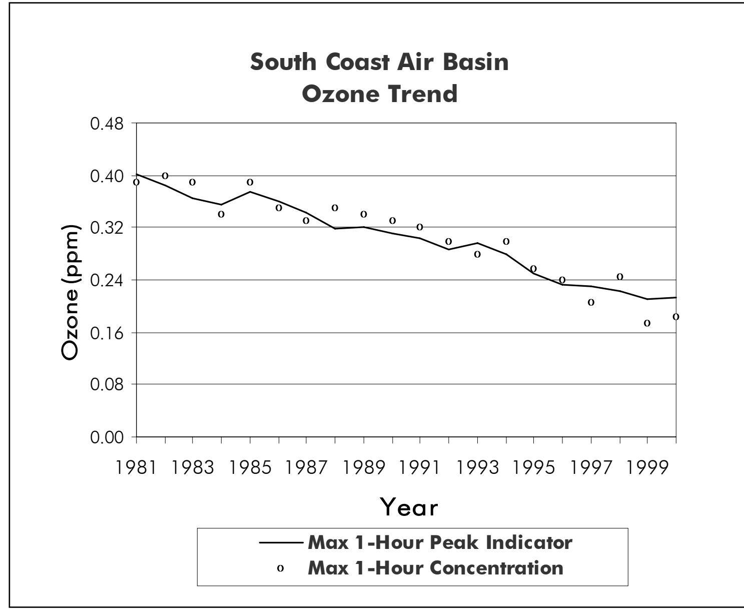

Figure 4-5

South Coast Air Basin

Ozone Air Quality Table

OZONE (ppm)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Peak 1-Hour Indicator	0.401	0.385	0.365	0.354	0.375	0.360	0.344	0.319	0.320	0.310	0.304	0.286	0.297	0.279	0.249	0.233	0.229	0.224	0.211	0.213
National 1-Hr. Design Value	0.420	0.390	0.360	0.360	0.360	0.350	0.350	0.340	0.330	0.330	0.310	0.300	0.300	0.280	0.250	0.231	0.215	0.217	0.211	0.211
Nat. 8-Hr. Design Value	0.251	0.233	0.229	0.225	0.226	0.222	0.217	0.205	0.192	0.186	0.182	0.180	0.177	0.171	0.165	0.161	0.148	0.154	0.147	0.146
Maximum 1-Hr. Concentration	0.390	0.400	0.390	0.340	0.390	0.350	0.330	0.350	0.340	0.330	0.320	0.300	0.280	0.300	0.256	0.239	0.205	0.244	0.174	0.184
Max. 8-Hr. Concentration	0.282	0.265	0.258	0.248	0.288	0.251	0.210	0.258	0.252	0.193	0.203	0.218	0.195	0.208	0.203	0.173	0.148	0.206	0.142	0.149
Days Above State Standard	233	198	192	209	207	217	196	216	211	185	184	190	185	165	153	141	144	107	111	115
Days Above Nat. 1-Hr. Std.	187	151	153	175	158	167	161	178	157	131	130	142	124	118	98	85	64	60	39	33
Days Above Nat. 8-Hr. Std.	199	166	169	190	181	191	179	194	181	161	160	173	161	148	120	115	118	93	93	94

Table 4-3

South Coast Air Basin

PM_{10} Emission Trends and Forecasts

Direct emissions of PM_{10} have been increasing in the South Coast Air Basin since 1975. A decrease in emissions would have been observed, if not for growth in emissions from area-wide sources, primarily fugitive dust from paved and unpaved roads and other sources. The increase in activity of these area-wide sources reflects the increased growth and vehicle miles traveled (VMT) in the air basin.

PM_{10} Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***291***	***312***	***341***	***398***	***387***	***364***	***360***	***371***
Stationary Sources	58	44	32	31	22	22	23	24
Area-wide Sources	196	228	263	317	325	302	297	307
On-Road Mobile	14	16	23	25	21	20	20	21
Gasoline Vehicles	10	8	10	11	12	14	15	17
Diesel Vehicles	4	8	13	14	8	6	5	4
Other Mobile	23	24	23	24	19	19	19	18

Table 4-4

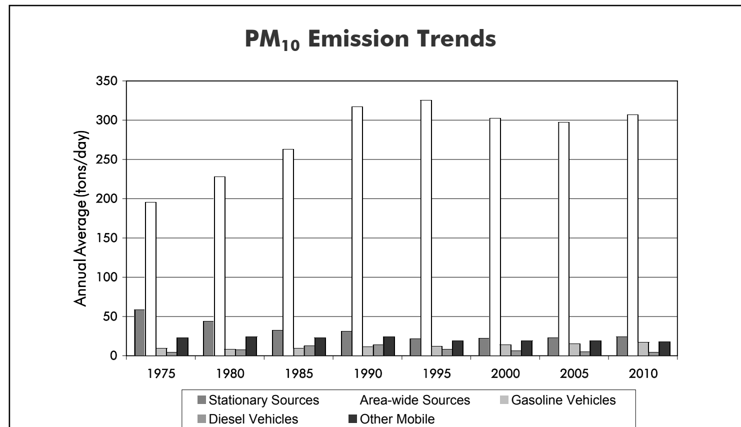

Figure 4-6

South Coast Air Basin

PM_{10} Air Quality Trend

As with other pollutants, the PM_{10} statistics also show overall improvement. During the period for which data are available, the maximum annual geometric mean decreased about 33 percent. Although the values for the last several years show some variability, this is probably due to meteorology rather than a change in emissions. Despite the overall decrease, ambient concentrations still exceed the State annual and 24-hour PM_{10} standards. Similar to the ambient concentrations, the calculated number of days above the 24-hour PM_{10} standards has also dropped. During 1988, there were 306 calculated days above the State standard and 30 calculated days above the national standard. By 2000, there were still 246 calculated State standard exceedance days. In contrast, there were no national standard exceedance days.

Despite these decreases, PM_{10} continues to pose a significant problem in the South Coast Air Basin. While emission controls implemented for ozone will also benefit PM_{10}, more controls aimed specifically at reducing PM_{10} will be needed to reach attainment.

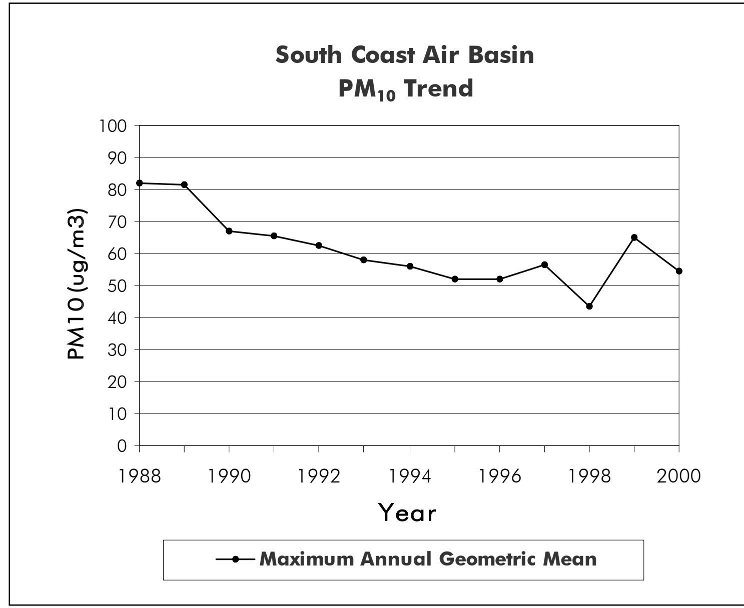

Figure 4-7

South Coast Air Basin

PM_{10} Air Quality Table

PM_{10} (ug/m3)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Max. 24-Hour Concentration								289	271	475	179	649	231	161	219	162	227	116	183	139
Max. Annual Geometric Mean								81.8	81.3	66.9	65.5	62.4	58.0	56.0	51.8	52.0	56.3	43.3	64.9	54.6
Calc Days Above State 24-Hr Std								306	300	276	246	234	252	246	228	255	246	186	258	246
Calc Days Above Nat 24-Hr Std.								30	33	18	12	12	18	6	24	6	6	0	6	0

Table 4-5

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South Coast Air Basin
Carbon Monoxide Emission Trends and Forecasts

Emissions of CO have been trending downward since 1975 in the South Coast Air Basin even though motor vehicle miles traveled have increased and industrial activity has grown. On-road motor vehicle controls are primarily responsible for this decline in emissions of CO. Stationary source emissions decreased during the 1970s and 1980s as a result of a decline in the manufacture of carbon black (a material used in the manufacture of tires) and steel in the South Coast Air Basin. CO emissions from other mobile sources are projected to decrease as more stringent emission standards are adopted.

CO Emission Trends (tons/day, annual average)								
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010
All Sources	***15497***	***13145***	***13012***	***10472***	***7918***	***5884***	***4230***	***3295***
Stationary Sources	297	289	76	101	57	52	55	58
Area-wide Sources	167	178	217	230	247	308	336	352
On-Road Mobile	14125	11721	11702	9030	6609	4631	3008	2104
Gasoline Vehicles	14105	11684	11637	8954	6551	4583	2967	2069
Diesel Vehicles	20	37	66	76	59	48	42	35
Other Mobile	909	957	1016	1110	1005	893	830	781

Table 4-6

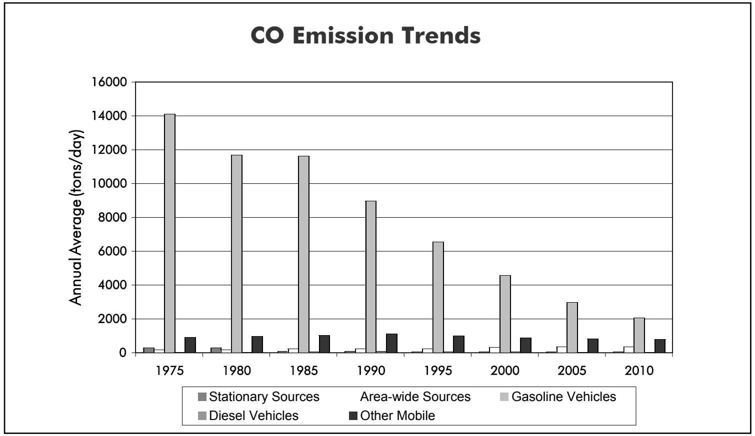

Figure 4-8

South Coast Air Basin

Carbon Monoxide Air Quality Trend

Carbon monoxide concentrations in the South Coast Air Basin have decreased markedly -- a total decrease of 48 percent in the maximum peak 8-hour indicator since 1981. The number of standard exceedance days has also declined. There were 89 days above the State standard and 78 days above the national standard during 1981. However, during 2000, there were only 6 State standard exceedance days and 3 national standard exceedance days.

While the entire South Coast Air Basin is designated as nonattainment for the national carbon monoxide standards and Los Angeles County is designated as nonattainment for the State standards, CO violations are limited to a small portion of Los Angeles County. No violations have occurred in the other three counties since 1992. Continued reductions in motor vehicle emissions should eventually bring the entire area into attainment.

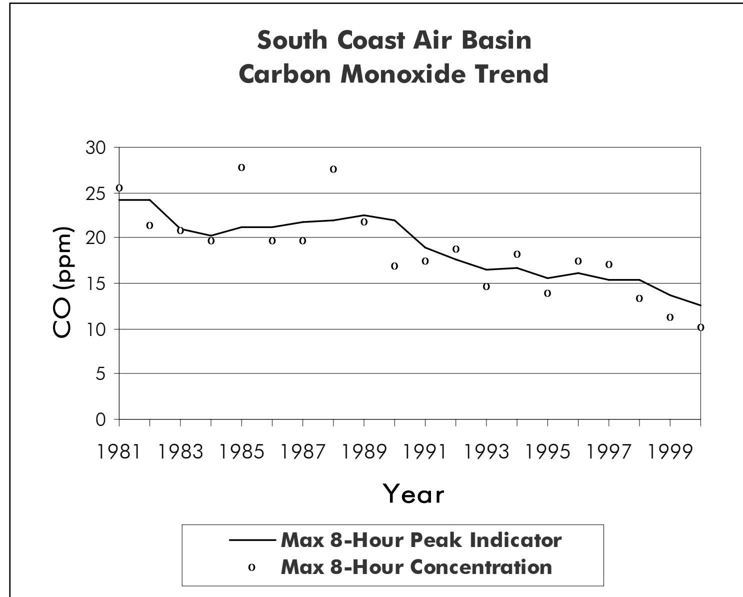

Figure 4-9

South Coast Air Basin

Carbon Monoxide Air Quality Table

CARBON MONOXIDE (ppm)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Peak 8-Hr. Indicator	24.1	24.1	21.0	20.2	21.1	21.1	21.7	21.9	22.5	21.9	19.0	17.7	16.5	16.7	15.6	16.1	15.4	15.4	13.7	12.6
Max. 1-Hr. Concentration	31.0	27.0	31.0	29.0	33.0	27.0	26.0	32.0	31.0	24.0	30.0	28.0	21.0	24.9	16.8	22.5	19.2	17.0	19.0	13.8
Max. 8-Hr. Concentration	25.5	21.3	20.9	19.7	27.7	19.7	19.6	27.5	21.8	16.8	17.4	18.8	14.6	18.2	13.8	17.5	17.1	13.3	11.2	10.1
Days Above State 8-Hr. Std.	89	79	67	79	64	58	50	73	71	50	51	39	29	27	17	26	18	13	11	6
Days Above Nat. 8-Hr. Std.	78	68	57	66	54	49	40	65	67	42	41	34	19	19	14	19	13	10	7	3

Table 4-7

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South Coast Air Basin

Nitrogen Dioxide

Oxides of Nitrogen Emission Trends and Forecasts

NO_x (and nitrogen dioxide) emissions in the South Coast Air Basin have been trending downward since 1975. This decline should continue as more stringent motor vehicle and stationary source emission standards are adopted and implemented.

NO_x Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***1751***	***1708***	***1801***	***1638***	***1339***	***1101***	***864***	***680***
Stationary Sources	383	361	323	182	136	98	73	74
Area-wide Sources	33	36	37	30	29	32	35	29
On-Road Mobile	991	945	1087	1063	875	679	490	351
Gasoline Vehicles	911	791	819	711	610	440	278	192
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Table 4-8

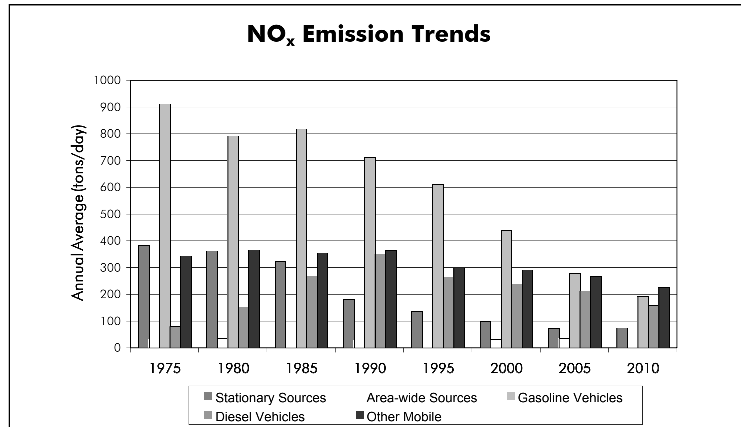

Figure 4-10

South Coast Air Basin

Nitrogen Dioxide Air Quality Trend

The South Coast Air Basin is one of only a few areas in California where nitrogen dioxide has been a problem. However, over the last 20 years, there has been a fairly steady decline in NO_2 values. The maximum peak 1-hour indicator for 2000 was less than half what it was during 1981. Nitrogen dioxide concentrations in the South Coast area no longer violate the State and national standards. Furthermore, the downward trend should continue in the future.

Nitrogen dioxide is formed from oxides of nitrogen emissions, which also contribute to ozone. As a result, the majority of the future emission control measures will be implemented as part of the overall ozone control strategy. Many of these control measures will target mobile sources, which account for about three-quarters of California's oxides of nitrogen emissions.

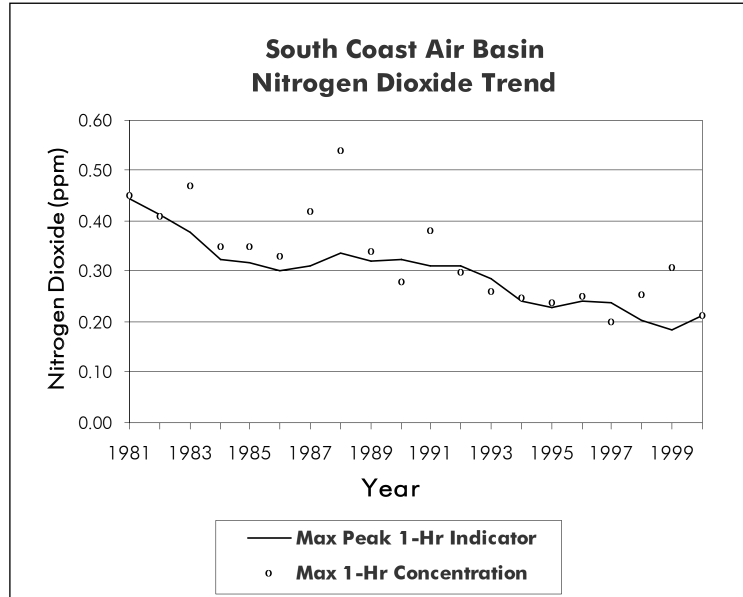

Figure 4-11

South Coast Air Basin

Nitrogen Dioxide Air Quality Table

NITROGEN DIOXIDE (ppm)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Peak 1-Hr. Indicator	0.445	0.414	0.378	0.324	0.317	0.303	0.311	0.335	0.322	0.324	0.312	0.311	0.285	0.241	0.229	0.242	0.237	0.202	0.185	0.213
Max. 1-Hr. Concentration	0.450	0.410	0.470	0.350	0.350	0.330	0.420	0.540	0.340	0.280	0.380	0.300	0.260	0.247	0.239	0.250	0.200	0.255	0.307	0.214
Max. Annual Average	0.071	0.062	0.059	0.057	0.060	0.061	0.055	0.061	0.057	0.055	0.055	0.051	0.050	0.050	0.046	0.042	0.043	0.043	0.051	0.044

Table 4-9

San Francisco Bay Area Air Basin

Introduction - Area Description

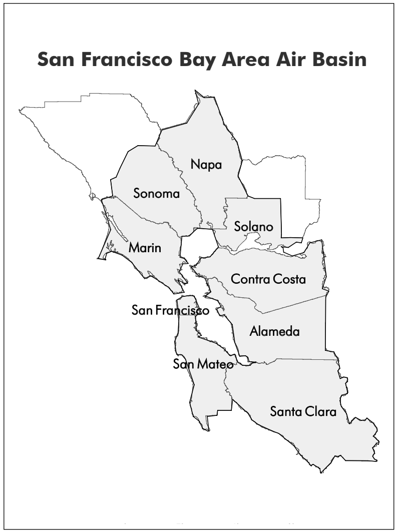

Figure 4-12

The San Francisco Bay Area is California's second largest metropolitan area and is the focal point of northern California. The nine county area comprises all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties, the southern half of Sonoma County, and the southwestern portion of Solano County. The unifying feature of the area is the Bay itself, which is oriented north-south and covers about 400 square miles of the area's total 5,545 square miles. About 20 percent of California's population resides in the San Francisco Bay Area, and pollution sources in the region account for about 16 percent of the total statewide criteria pollutant emissions. The climate in the San Francisco Bay Area varies from one location to the next. Along the coast, temperatures are mild year-round. However, as one moves inland, temperatures show larger diurnal and seasonal variations. Overall air quality in the San Francisco Bay Area Air Basin is better than in the South Coast Air Basin. This is due to a more favorable climate, with cooler temperatures and better ventilation. However, violations of both the State and national ozone standards continue to occur in the San Francisco Bay Area Air Basin, and still pose challenges to State and local air pollution control agencies.

San Francisco Bay Area Air Basin
Emission Trends and Forecasts

The emission levels for the ozone precursors NO_x and ROG have been trending downward in the San Francisco Bay Area Air Basin since 1975. CO emissions have also been trending downward since 1975. On-road motor vehicles are the largest contributors to CO, ROG, and NO_x emissions in the air basin. The implementation of stricter mobile source (both on-road and other) emission standards will continue to decrease vehicle emissions in this air basin. Controls on stationary source solvent evaporation and fugitive emissions will also continue to impact ROG emissions.

San Francisco Bay Area Air Basin

Population and VMT

Compared to the State's other urban areas, population and the number of vehicle miles traveled each day grew at a slower rate in the San Francisco Bay Area Air Basin from 1981 to 2000. During that 20-year period, the population increased about 27 percent -- from about 5.3 million in 1981 to more than 6.7 million in 2000. During the same period, the daily VMT increased about 63 percent--from nearly 98 million miles per day in 1981 to about 159 million miles per day in 2000. While these growth rates are lower than the growth rates seen in the other urban areas, they still represent substantial increases.

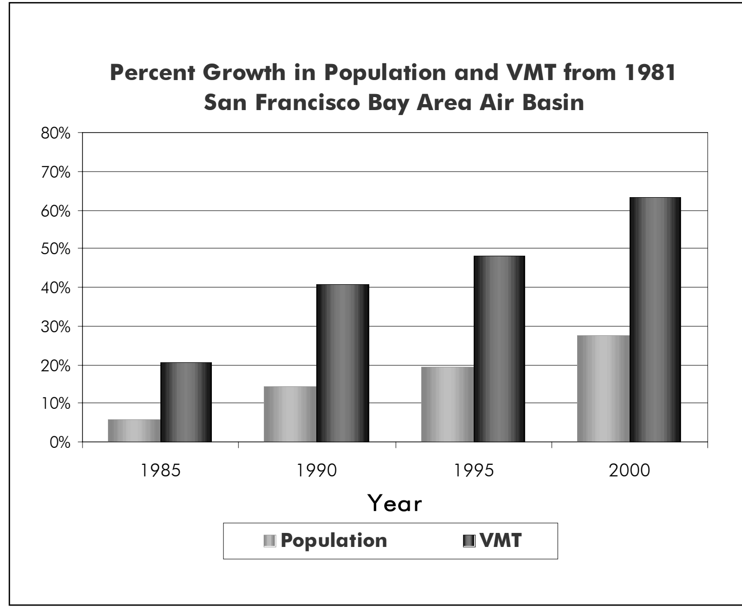

Figure 4-13

San Francisco Bay Area Air Basin
Ozone Precursor Emission Trends
Trends and Forecasts

Emissions of ozone precursors have decreased in the San Francisco Bay Area Air Basin since 1975 and are projected to continue declining through 2010. The Bay Area has a significant motor vehicle population, and the implementation of stricter motor vehicle controls has resulted in significant emissions reductions for NO_x and ROG. Stationary source emissions of ROG have declined over the last 20 years due to new controls for oil refinery fugitive emissions and new rules for control of ROG from various industrial coatings and solvent operations.

NO_x Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***951***	***966***	***899***	***866***	***746***	***636***	***546***	***443***
Stationary Sources	239	217	145	139	113	91	87	88
Area-wide Sources	20	22	20	23	24	23	22	22
On-Road Mobile	525	567	562	518	432	349	279	198
Gasoline Vehicles	484	495	438	358	303	218	161	113
Diesel Vehicles	42	72	124	160	129	131	118	86
Other Mobile	167	160	172	185	177	174	159	134

Table 4-10

ROG Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***1339***	***1333***	***1091***	***798***	***684***	***552***	***457***	***396***
Stationary Sources	303	318	239	166	155	144	142	144
Area-wide Sources	94	95	96	102	93	90	84	85
On-Road Mobile	880	853	684	451	347	242	177	123
Gasoline Vehicles	877	849	677	443	341	237	172	119
Diesel Vehicles	3	5	7	8	6	5	5	4
Other Mobile	62	67	72	79	88	76	53	43

Table 4-11

San Francisco Bay Area Air Basin
Ozone Precursor Emission Trends and Forecasts

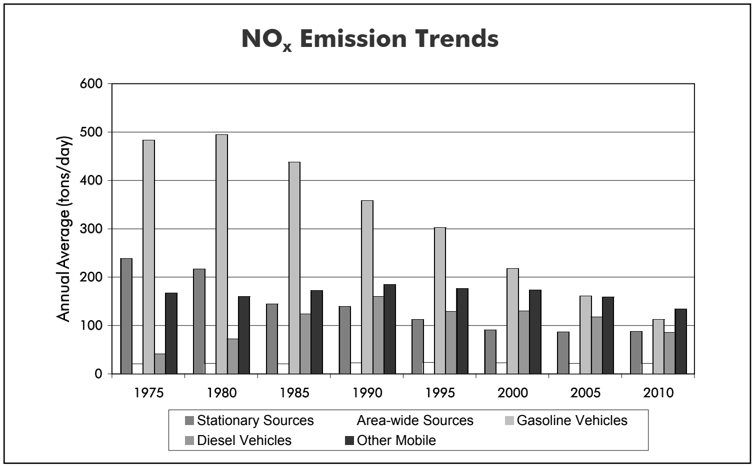

Figure 4-14

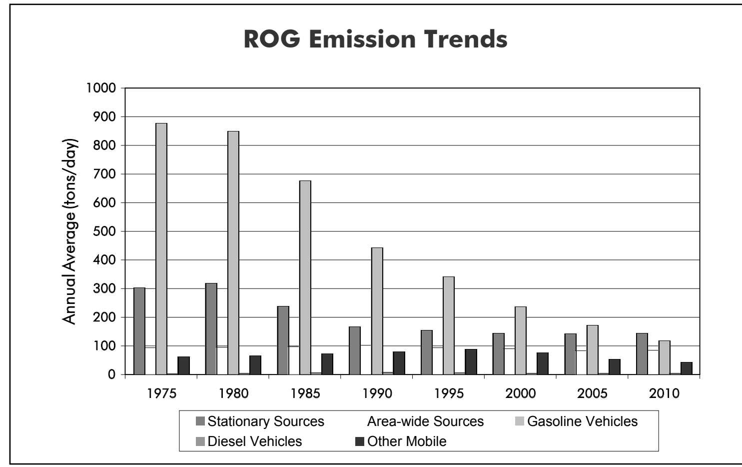

Figure 4-15

San Francisco Bay Area Air Basin

Ozone Air Quality Trend

Ozone concentrations in the San Francisco Bay Area are much lower than in the South Coast Air Basin. The peak 1-hour indicator declined about 12 percent from 1981 to 2000. Although the trend has not been consistently downward, the ambient concentrations generally declined from 1981 to 1994. Since 1994, the peak indicator values have been somewhat higher. However, it is not yet clear whether these data represent a significant change in the overall trend. Data for 1999 and 2000 are slightly lower than values during the prior few years.

The number of days above the State and national 1-hour standards show a similar trend. The number of exceedance days generally decreased until the mid-1990s and then increased during 1995 to 1998. The one exception is 1997, when there was a sharp decline in the number of exceedance days. However, meteorological conditions during 1997 were favorable for low ozone concentrations. Given this, the low values during that year are not unexpected. During 1999 and 2000, the number of exceedance days again declined. However, data from more years are needed to determine whether the improvement will continue.

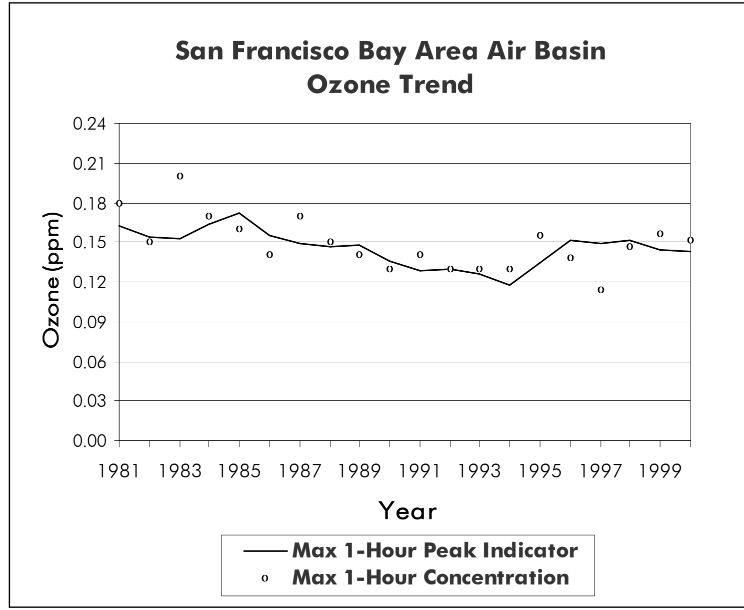

Figure 4-16

San Francisco Bay Area Air Basin

Ozone Air Quality Table

OZONE (ppm)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Peak 1-Hour Indicator	0.162	0.154	0.153	0.164	0.172	0.155	0.149	0.147	0.148	0.136	0.129	0.130	0.126	0.118	0.135	0.151	0.149	0.151	0.144	0.143
National 1-Hr. Design Value	0.190	0.180	0.160	0.160	0.160	0.150	0.140	0.140	0.140	0.130	0.130	0.120	0.120	0.121	0.138	0.138	0.138	0.138	0.139	0.139
Nat. 8-Hr. Design Value	0.103	0.094	0.095	0.100	0.103	0.097	0.092	0.092	0.097	0.088	0.084	0.082	0.081	0.082	0.087	0.093	0.090	0.089	0.086	0.087
Maximum 1-Hr. Concentration	0.180	0.150	0.200	0.170	0.160	0.140	0.170	0.150	0.140	0.130	0.140	0.130	0.130	0.130	0.155	0.138	0.114	0.147	0.156	0.152
Max. 8-Hr. Concentration	0.123	0.108	0.150	0.124	0.127	0.106	0.116	0.101	0.102	0.105	0.108	0.101	0.112	0.097	0.115	0.112	0.084	0.111	0.122	0.114
Days Above State Standard	51	36	53	55	45	39	46	41	22	14	23	23	19	13	28	34	8	29	20	12
Days Above Nat. 1-Hr. Std.	8	5	21	22	9	5	14	5	4	2	2	2	3	2	11	8	0	8	3	3
Days Above Nat. 8-Hr. Std.	23	13	26	32	17	13	29	20	13	7	6	6	5	4	18	14	0	16	9	4

Table 4-12

San Francisco Bay Area Air Basin

PM_{10} Emission Trends and Forecasts

Direct emissions of PM_{10} are increasing slightly in the San Francisco Bay Area Air Basin between 1975 and 2010. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust sources. Emissions of directly emitted PM_{10} from diesel motor vehicles have been decreasing since 1990 even though population and vehicle miles traveled (VMT) are growing, due to adoption of more stringent emission standards.

PM10 Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***143***	***147***	***159***	***170***	***177***	***183***	***194***	***203***
Stationary Sources	38	27	23	20	22	18	19	20
Area-wide Sources	86	100	112	124	133	143	152	162
On-Road Mobile	7	8	11	12	10	10	10	10
Gasoline Vehicles	5	5	5	5	6	7	7	8
Diesel Vehicles	2	4	6	7	4	3	3	2
Other Mobile	12	12	13	14	13	13	13	12

Table 4-13

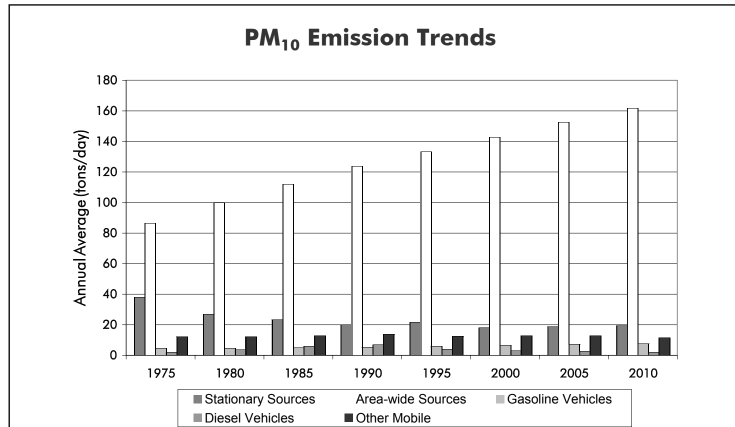

Figure 4-17

San Francisco Bay Area Air Basin

PM_{10} Air Quality Trend

PM_{10} is generally sampled only once every six days. As a result, there are fewer data on which to base historical trends. However, based on the data that are available, the annual geometric mean concentration declined more than 30 percent from 1988 to 2000.

The data show that the annual State standard has not been exceeded for nearly a decade. Furthermore, calculated exceedance days for the State 24-hour standard dropped from a high of 90 days during 1991 to 42 days during 2000. The national 24-hour standard was last exceeded in 1991. Because many of the same sources contribute to both ozone and PM_{10}, future ozone precursor emission controls should help ensure continued PM_{10} improvements.

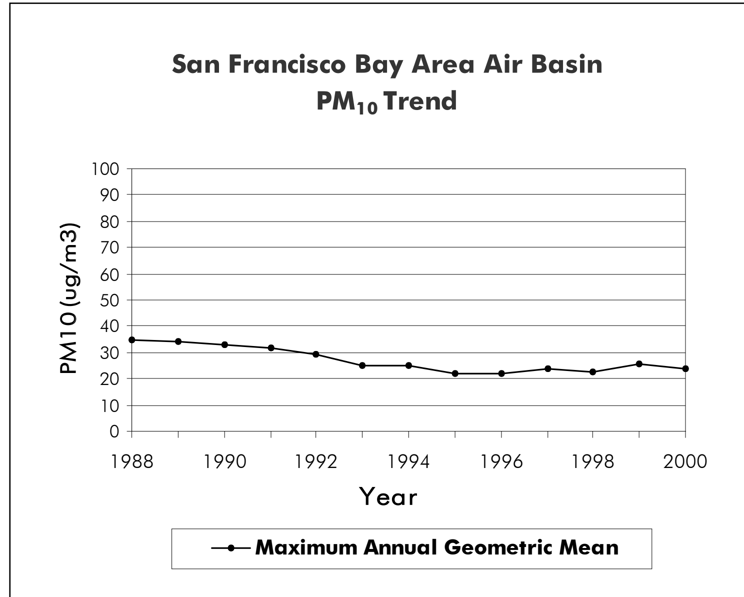

Figure 4-18

San Francisco Bay Area Air Basin

PM_{10} Air Quality Table

PM_{10} (ug/m3)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Max. 24-Hour Concentration								146	150	173	155	112	101	97	74	76	95	92	114	76
Max. Annual Geometric Mean								34.6	34.4	33.0	31.5	29.5	25.1	24.8	22.1	22.1	23.7	22.5	25.4	23.7
Calc Days Above State 24-Hr Std								78	84	72	90	78	48	42	24	12	18	18	36	42
Calc Days Above Nat 24-Hr Std								0	0	6	3	0	0	0	0	0	0	0	0	0

Table 4-14

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San Francisco Bay Area Air Basin

Carbon Monoxide Emission Trends and Forecasts

Emissions of CO have been declining in the San Francisco Bay Area Air Basin over the last 25 years. Motor vehicles and other mobile sources are the largest sources of CO emissions in the air basin. Emissions from motor vehicles have been declining, with the introduction of new automotive emission controls, despite increases in vehicle miles traveled (VMT). Oil refineries, manufacturing, and electric generation contribute a significant portion of the stationary source CO emissions. Area-wide CO emissions are primarily from residential fuel combustion (including wood), waste burning, and fires.

CO Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***8382***	***8131***	***7013***	***5243***	***3964***	***2933***	***2284***	***1727***
Stationary Sources	47	57	75	67	59	36	36	38
Area-wide Sources	166	165	165	166	167	168	168	169
On-Road Mobile	7787	7505	6321	4506	3227	2277	1659	1125
Gasoline Vehicles	7777	7487	6291	4471	3198	2252	1637	1106
Diesel Vehicles	10	18	31	35	29	25	23	19
Other Mobile	382	404	451	503	511	452	420	395

Table 4-15

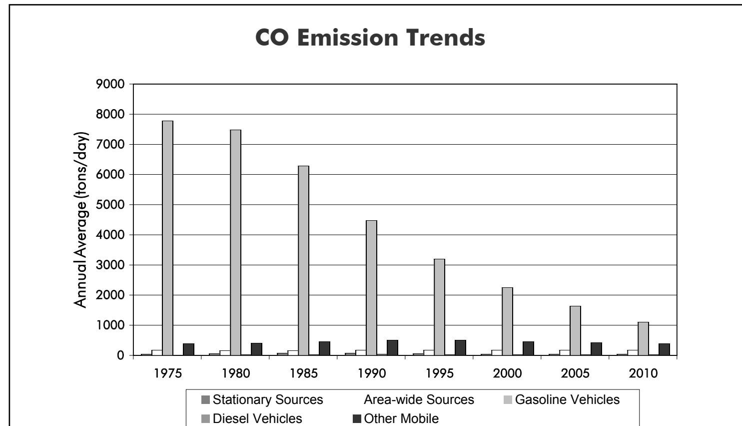

Figure 4-19

San Francisco Bay Area Air Basin

Carbon Monoxide Air Quality Trend

As in other areas of the State, carbon monoxide concentrations in the San Francisco Bay Area Air Basin have declined substantially over the last 20 years. The peak 8-hour indicator value during 2000 was less than half what it was during 1981 and is now well below the level of the standards. In fact, neither the State nor the national standards have been exceeded in this area since 1991.

Much of the decline in ambient carbon monoxide concentrations can be attributed to the introduction of clean fuels and newer, cleaner motor vehicles. The San Francisco Bay Area Air Basin is currently designated as attainment for both the State and national CO standards. Based on emission projections, the area is expected to maintain its attainment status in the coming years.

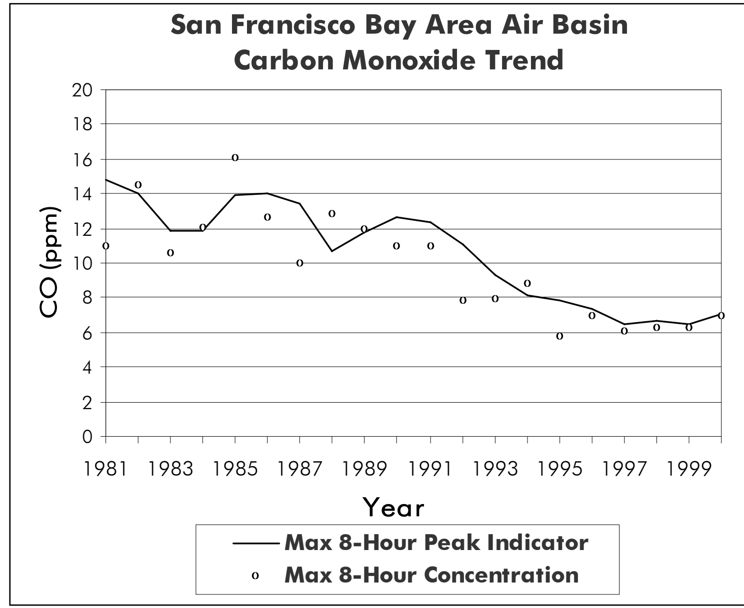

Figure 4-20

San Francisco Bay Area Air Basin

Carbon Monoxide Air Quality Table

CARBON MONOXIDE (ppm)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Peak 8-Hr. Indicator	14.8	14.0	11.9	11.9	13.9	14.0	13.4	10.7	11.8	12.6	12.4	11.1	9.3	8.1	7.8	7.4	6.5	6.7	6.5	7.1
Max. 1-Hr. Concentration	16.0	18.0	17.0	20.0	21.0	20.0	17.0	15.0	19.0	18.0	15.0	12.0	14.0	12.0	10.1	8.8	10.7	8.7	9.0	9.8
Max. 8-Hr. Concentration	11.0	14.5	10.6	12.1	16.1	12.6	10.0	12.8	12.0	11.0	11.0	7.8	7.9	8.8	5.8	7.0	6.1	6.3	6.3	7.0
Days Above State 8-Hr. Std.	6	15	4	8	24	8	2	4	10	4	5	0	0	0	0	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	4	12	4	7	21	8	1	4	9	2	4	0	0	0	0	0	0	0	0	0

Table 4-16

San Joaquin Valley Air Basin

Introduction - Area Description

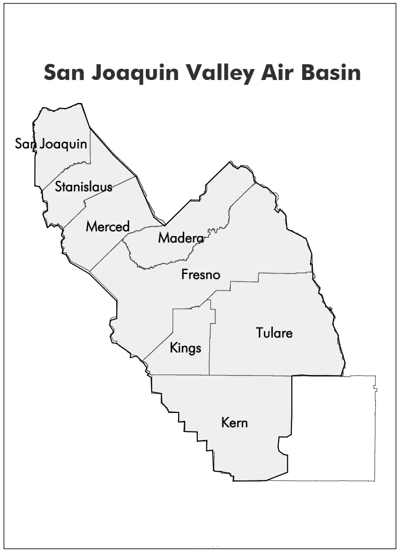

Figure 4-21

The San Joaquin Valley Air Basin occupies the southern two-thirds of California's Central Valley. The eight-county area comprises Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties and the western portion of Kern County. The Valley spreads across nearly 25,000 square miles. With very few exceptions, the San Joaquin Valley is flat and unbroken, with most of the area below 400 feet elevation. The Valley floor slopes downward from east to west, and the San Joaquin River winds its way along the western side from south to north. Similar to other inland areas, the San Joaquin Valley has cool wet winters and hot dry summers. Generally, the temperature increases and rainfall decreases from north to south.

In contrast to other California areas, air quality in the San Joaquin Valley is not dominated by emissions from one large urban area. Instead, there are a number of moderately sized urban areas spread along the main axis of the Valley. This wide distribution of emissions complicates the challenge faced by air quality control agencies. Overall, about 9 percent of California's population lives in the San Joaquin Valley, and pollution sources in the region account for about 14 percent of the total statewide criteria pollutant emissions.

San Joaquin Valley Air Basin

Emission Trends and Forecasts

Overall, the emission levels in the San Joaquin Valley Air Basin have been decreasing since 1990, with the exception of PM_{10} emissions. The decreases are predominantly due to motor vehicle controls and reductions in evaporative and fugitive emissions. On-road motor vehicles are the largest contributors to CO emissions in the San Joaquin Valley. On-road motor vehicles, other mobile sources, and stationary sources are all significant contributors to NO_x emissions. A significant portion of the stationary source ROG emissions is fugitive emissions from the extensive oil and gas production operations in the lower San Joaquin Valley. PM_{10} emissions are mostly fugitive dust from paved and unpaved roads, agricultural operations, and waste burning.

San Joaquin Valley Air Basin

Population and VMT

Compared to California's other urban areas, the population and number of vehicle miles traveled each day in the San Joaquin Valley Air Basin grew at a much faster rate during the 1981 to 2000 time period. The population increased about 56 percent, from nearly 2.1 million in 1981 to over 3.2 million in 2000. During the same period, the daily VMT more than doubled -- from about 35 million miles per day in 1981 to over 82 million miles per day in 2000.This represents a 136 percent increase. Because these growth rates are so much higher than the growth rates in other areas, there has not been the same level of air quality improvement in the San Joaquin Valley Air Basin, especially with respect to ozone.

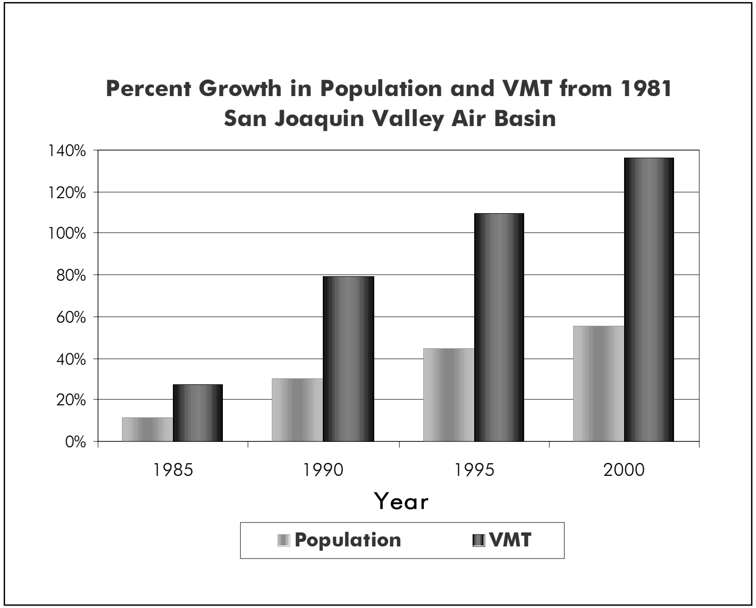

Figure 4-22

San Joaquin Valley Air Basin

Ozone Precursor Emission Trends and Forecasts

Emissions of the ozone precursors NO_x and ROG are decreasing in the San Joaquin Valley Air Basin. Both stationary source and motor vehicle NO_x emissions have been reduced by the adoption of more stringent emission standards. Stricter standards have reduced ROG emissions from motor vehicles since 1980, even though vehicle miles traveled (VMT) have been increasing. Stationary and area-wide sources of ROG include petroleum production operations and the use of solvents. Stricter emission standards and new controls have reduced the ROG emissions from these sources. Also, declining crude oil prices have resulted in cutbacks in oil production activities and an attendant decrease in ROG fugitive emissions. Future increases in oil prices could result in higher levels of production, which could again increase emissions.

NO_x Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***614***	***775***	***757***	***796***	***678***	***577***	***494***	***426***
Stationary Sources	199	279	268	279	220	174	162	169
Area-wide Sources	7	9	10	10	11	12	12	13
On-Road Mobile	202	245	287	323	295	246	198	145
Gasoline Vehicles	160	175	175	184	178	138	96	66
Diesel Vehicles	42	70	112	139	118	108	103	78
Other Mobile	207	243	192	184	152	144	122	99

Table 4-17

ROG Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***950***	***1032***	***914***	***625***	***509***	***477***	***440***	***424***
Stationary Sources	496	544	439	164	97	96	102	108
Area-wide Sources	116	141	149	168	154	180	189	204
On-Road Mobile	284	286	269	236	197	144	104	72
Gasoline Vehicles	282	282	262	228	191	139	99	68
Diesel Vehicles	3	5	7	8	6	5	5	4
Other Mobile	55	61	57	58	62	57	46	40

Table 4-18

San Joaquin Valley Air Basin
Ozone Precursor Emission Trends and Forecasts

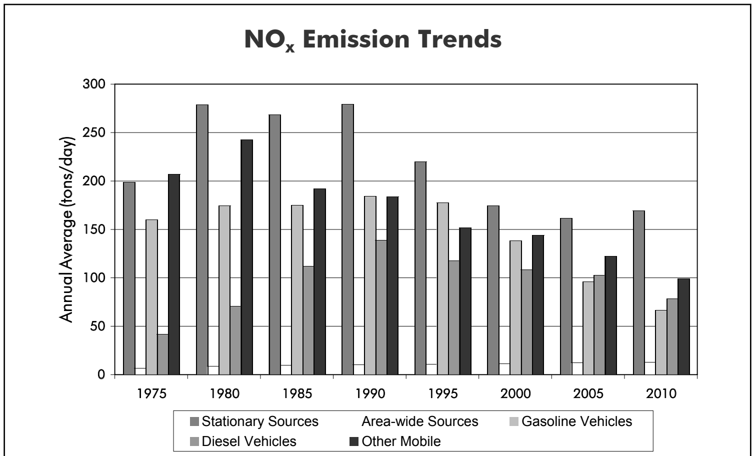

Figure 4-23

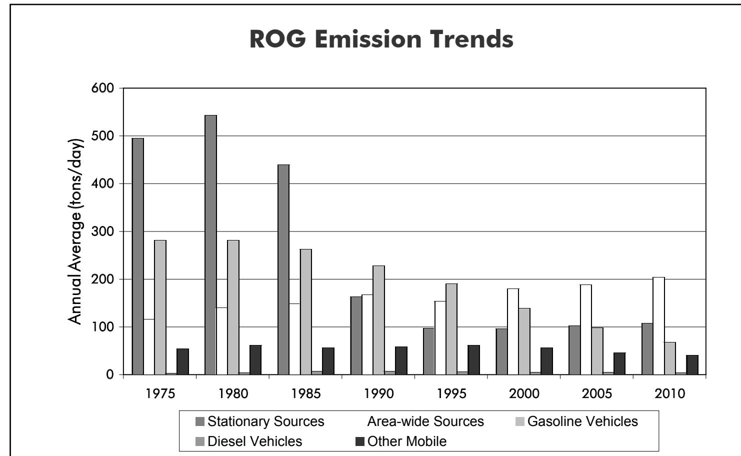

Figure 4-24

San Joaquin Valley Air Basin

Ozone Air Quality Trend

The ozone problem in the San Joaquin Valley ranks among the most severe in the State. During 1981 through 2000, the maximum peak 1-hour indicator decreased slightly, on the order of 14 percent. The number of national 1-hour standard exceedance days has shown a greater improvement. During 1981, there were 69 national 1-hour standard exceedance days. This compares with 30 national 1-hour standard exceedance days in 2000. In contrast, the number of State standard exceedance days shows a much smaller drop -- 130 in 1981 compared with 114 in 2000.

While air quality as related to ozone has improved throughout the State, the inland areas have generally shown less improvement than the coastal areas. This is due in part to the faster growth rates in the inland areas such as the San Joaquin Valley.

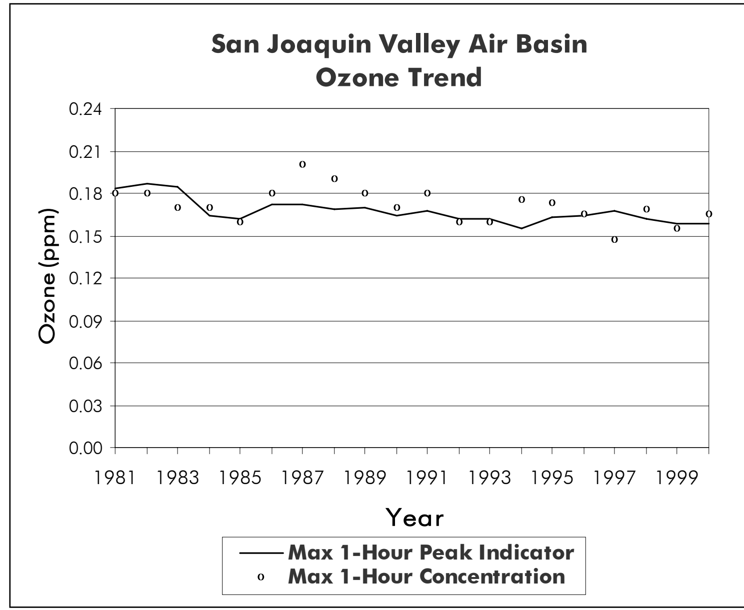

Figure 4-25

San Joaquin Valley Air Basin

Ozone Air Quality Table

OZONE (ppm)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Peak 1-Hour Indicator	0.183	0.186	0.184	0.164	0.162	0.172	0.172	0.169	0.170	0.164	0.167	0.162	0.162	0.155	0.163	0.164	0.167	0.162	0.159	0.158
National 1-Hr. Design Value	0.180	0.170	0.170	0.160	0.160	0.170	0.170	0.170	0.170	0.160	0.160	0.160	0.160	0.160	0.165	0.165	0.164	0.161	0.161	0.161
Nat. 8-Hr. Design Value	0.127	0.123	0.116	0.114	0.111	0.117	0.118	0.121	0.120	0.119	0.118	0.115	0.112	0.111	0.119	0.119	0.115	0.115	0.113	0.111
Maximum 1-Hr. Concentration	0.180	0.180	0.170	0.170	0.160	0.180	0.200	0.190	0.180	0.170	0.180	0.160	0.160	0.175	0.173	0.165	0.147	0.169	0.155	0.165
Max. 8-Hr. Concentration	0.148	0.133	0.122	0.136	0.131	0.135	0.150	0.127	0.136	0.123	0.130	0.121	0.125	0.129	0.134	0.137	0.127	0.136	0.123	0.131
Days Above State Standard	130	113	105	135	149	147	156	156	148	131	133	127	125	118	124	120	110	90	123	114
Days Above Nat. 1-Hr. Std.	69	43	41	61	53	59	65	74	54	45	51	29	43	43	44	56	16	39	28	30
Days Above Nat. 8-Hr. Std.	96	108	100	120	127	134	148	140	133	104	121	119	104	108	109	114	95	84	117	103

Table 4-19

San Joaquin Valley Air Basin

PM_{10} Emission Trends and Forecasts

Direct emissions of PM_{10} are increasing in the San Joaquin Valley Air Basin between 1975 and 2010. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, waste burning, and residential fuel combustion (including wood). Emissions of directly emitted PM_{10} from motor vehicles are decreasing between 1990 and 2010 due to new diesel standards.

PM10 Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***366***	***444***	***446***	***450***	***441***	***465***	***480***	***491***
Stationary Sources	55	42	37	30	31	30	28	29
Area-wide Sources	294	382	390	399	394	419	437	447
On-Road Mobile	4	5	7	9	7	7	7	7
Gasoline Vehicles	2	2	2	3	3	4	5	5
Diesel Vehicles	2	3	5	6	4	3	2	2
Other Mobile	12	15	12	12	9	9	8	7

Table 4-20

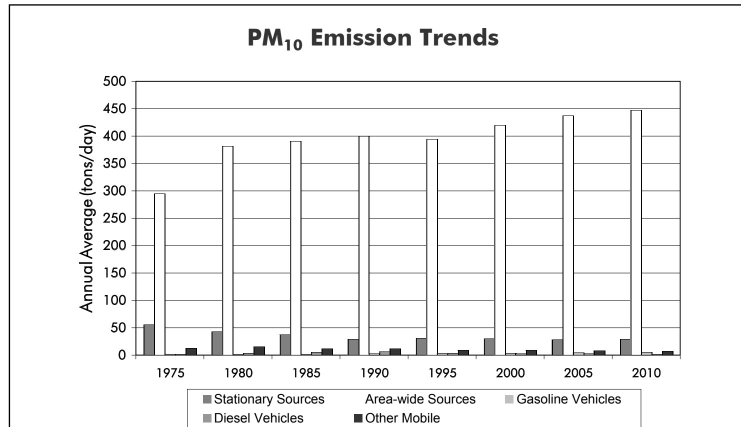

Figure 4-26

San Joaquin Valley Air Basin
PM_{10} Air Quality Trend

The available PM_{10} data show some variation during the trend period, but overall, there has been a downward trend. Part of the variation can be attributed to meteorology. Long periods of stagnation during the winter months allow PM_{10} to accumulate over many days with resulting high concentrations. The maximum annual geometric mean shows a decrease of about 24 percent from 1988 to 2000. The calculated number of days exceeding the State and national 24-hour standards also shows a decrease. There were 246 calculated State standard exceedance days and 27 calculated national standard exceedance days during 1988. During 2000, there were 180 calculated State standard exceedance days and no national standard exceedance days. Although PM_{10} air quality has improved overall in the San Joaquin Valley Air Basin, values for 1999 and 2000 were higher than those for 1998. We will need several more years of data before we can determine whether this trend is a result of meteorology or a change in emissions. However, based on the ambient data, it will still be a number of years before this area reaches attainment.

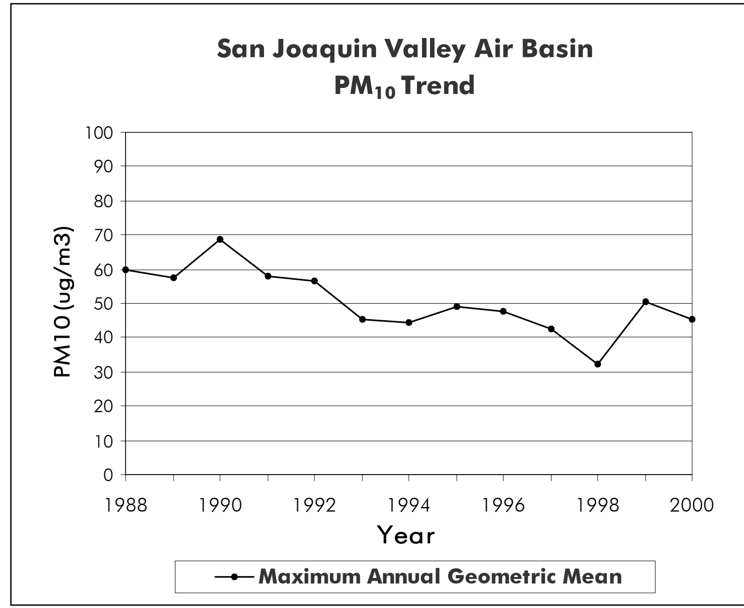

Figure 4-27

San Joaquin Valley Air Basin

PM_{10} Air Quality Table

PM_{10} (ug/m3)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Max. 24-Hour Concentration								244	250	439	279	183	239	190	279	153	199	160	183	145
Max. Annual Geometric Mean								60.0	57.3	68.5	58.1	56.6	45.3	44.3	48.9	47.6	42.3	32.1	50.3	45.4
Calc Days Above State 24-Hr Std								246	234	267	225	216	180	156	186	204	108	114	174	180
Calc Days Above Nat 24-Hr Std								27	36	30	24	6	18	12	9	0	6	6	9	0

Table 4-21

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San Joaquin Valley Air Basin

Carbon Monoxide Emission Trends and Forecasts

Emissions of CO are trending downward between 1985 and 2010. Motor vehicles are by far the largest source of CO emissions. Emissions from motor vehicles have been declining since 1985, despite increases in vehicle miles traveled (VMT), with the introduction of new automotive emission controls and fleet turnover.

CO Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***3350***	***3586***	***3434***	***3230***	***2610***	***2281***	***1836***	***1508***
Stationary Sources	177	157	66	77	65	60	61	63
Area-wide Sources	147	181	190	198	208	396	407	419
On-Road Mobile	2705	2853	2832	2586	1980	1493	1049	721
Gasoline Vehicles	2695	2834	2801	2551	1950	1469	1028	703
Diesel Vehicles	11	19	31	35	30	23	22	19
Other Mobile	321	395	347	369	358	332	318	304

Table 4-22

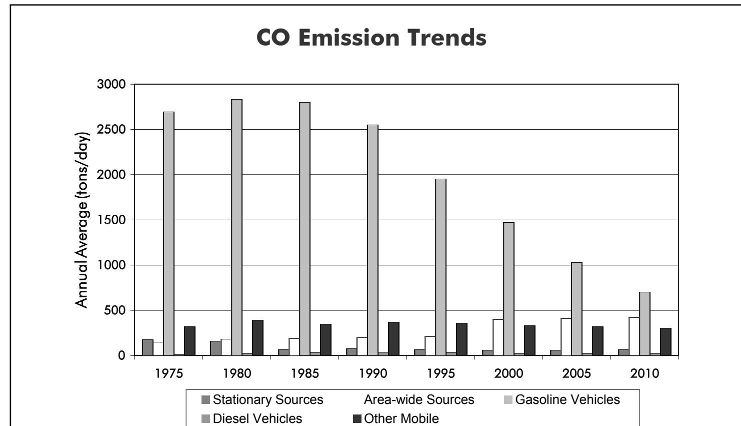

Figure 4-28

San Joaquin Valley Air Basin
Carbon Monoxide Air Quality Trend

Carbon monoxide concentrations show a fairly consistent downward trend from 1981 through 2000. Similar to other areas of the State, the trend line for the San Joaquin Valley Air Basin shows a slight increase during the late 1980s, probably related to meteorology. The maximum peak 8-hour indicator for 2000 is less than half that for 1981. Measured concentrations in the San Joaquin Valley Air Basin have not exceeded the national CO standards since 1991, and concentrations have not exceeded the State standards for the last five years. Much of the decline in ambient CO concentrations can be attributed to the introduction of clean fuels and newer, cleaner motor vehicles.

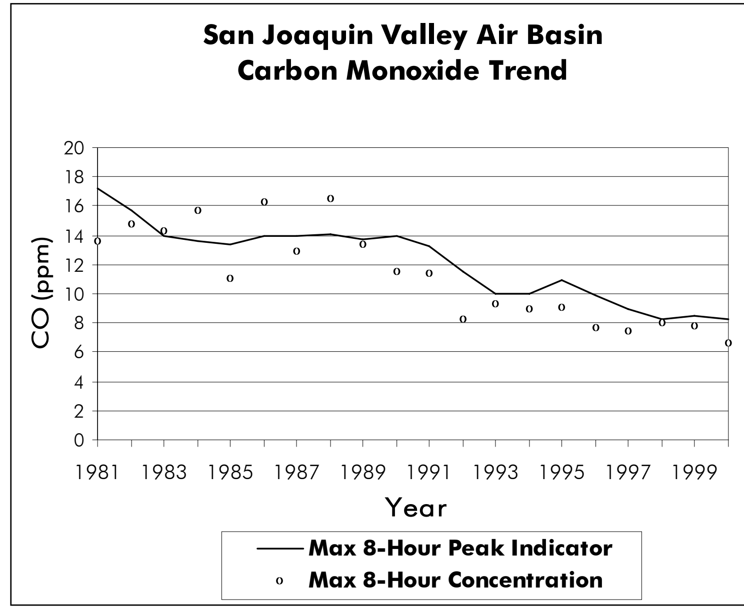

Figure 4-29

San Joaquin Valley Air Basin

Carbon Monoxide Air Quality Table

CARBON MONOXIDE (ppm)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Peak 8-Hr. Indicator	17.2	15.7	13.9	13.6	13.4	13.9	13.9	14.1	13.7	13.9	13.2	11.5	10.0	10.0	10.9	9.9	9.0	8.3	8.5	8.3
Max. 1-Hr. Concentration	18.0	18.0	17.0	24.0	18.0	21.0	16.0	19.0	23.0	17.0	19.0	13.0	13.0	15.0	12.0	11.0	9.9	10.3	11.9	10.1
Max. 8-Hr. Concentration	13.6	14.8	14.3	15.7	11.0	16.3	12.9	16.5	13.4	11.5	11.4	8.3	9.3	8.9	9.1	7.7	7.5	8.0	7.8	6.6
Days Above State 8-Hr. Std.	12	9	12	7	7	13	4	5	24	10	3	0	2	0	1	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	10	8	9	6	7	11	4	6	18	9	3	0	0	0	0	0	0	0	0	0

Table 4-23

San Diego Air Basin

Introduction - Area Description

Figure 4-30

The San Diego Air Basin lies in the southwest corner of California and comprises all of San Diego County. However, the population and emissions are concentrated mainly in the western portion of the County. The air basin covers 4,260 square miles, includes about 8 percent of the State's population, and produces about 7 percent of the State's criteria pollutant emissions. Because of its southerly location and proximity to the ocean, much of the San Diego Air Basin has a relatively mild climate.

Air quality in the San Diego Air Basin is impacted not only by local emissions, but also by pollutants transported from other areas -- in particular, ozone and ozone precursor emissions transported from the South Coast Air Basin and Mexico. Although the impact of transport is particularly important on days with high ozone concentrations, transported pollutants and emissions cannot be blamed entirely for the ozone problem in the San Diego area. Studies show that emissions from the San Diego Air Basin are sufficient, on their own, to cause ozone violations.

San Diego Air Basin

Emission Trends and Forecasts

Emissions of NO_x, ROG, PM_{10}, and CO in the San Diego Air Basin have been following the statewide trends since 1975. These trends are largely due to motor vehicle controls and reductions in evaporative emissions. Mobile sources (both on-road and other) are by far the largest contributors to NO_x, ROG, and CO emissions in the San Diego Air Basin. The majority of the PM_{10} emissions are from area-wide sources.

San Diego Air Basin

Population and VMT

Growth rates in the San Diego Air Basin during the last 20 years were among the highest in the State's urban areas. The population increased 54 percent -- from over 1.9 million in 1981 to over 2.8 million in 2000. During this same time period, the number of vehicle miles traveled each day increased over 100 percent -- from about 35 million miles per day in 1981 to nearly 74 million miles per day in 2000. As in other parts of California, overall air quality in the San Diego Air Basin has improved, despite high growth rates, indicating the benefits of cleaner technologies.

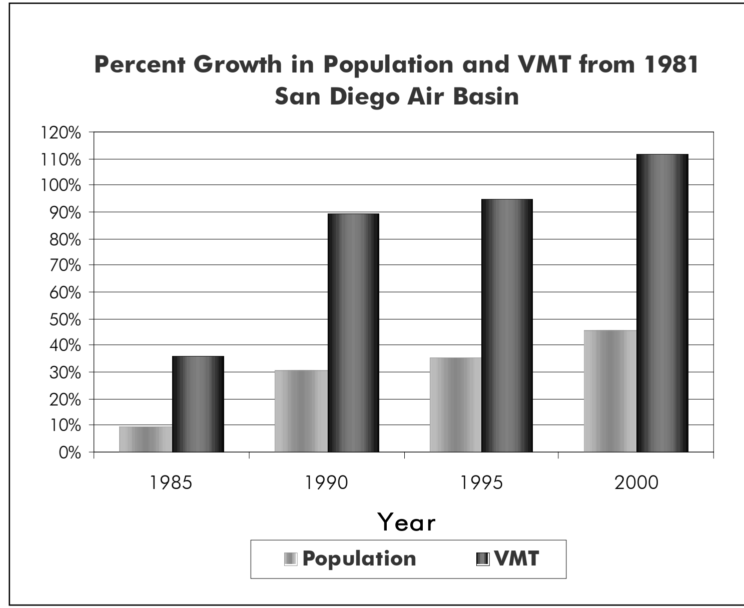

Figure 4-31

San Diego Air Basin

Ozone Precursor Emission Trends and Forecasts

Emissions of the ozone precursor NO_x remained relatively flat from 1975 to 1990, but are declining steadily from 1990 to 2010. ROG emissions have been decreasing overall since 1980. These decreases are mostly due to decreased emissions from motor vehicles, brought about by stricter motor vehicle emission standards. Stationary and area-wide source emissions of ROG have remained mostly unchanged over the last 20 years, with stricter emission standards offsetting industrial and population growth.

NO_x Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***275***	***278***	***289***	***321***	***276***	***235***	***191***	***154***
Stationary Sources	46	31	17	21	19	17	16	18
Area-wide Sources	2	2	2	3	3	3	3	4
On-Road Mobile	170	176	198	216	187	149	109	77
Gasoline Vehicles	160	158	162	162	139	103	65	44
Diesel Vehicles	10	18	35	54	47	46	44	33
Other Mobile	57	69	73	81	68	66	62	55

Table 4-24

ROG Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***412***	***420***	***391***	***332***	***275***	***226***	***195***	***182***
Stationary Sources	26	47	46	46	46	44	57	67
Area-wide Sources	36	42	44	47	42	43	43	46
On-Road Mobile	327	303	267	200	146	103	70	48
Gasoline Vehicles	326	302	265	197	144	101	68	47
Diesel Vehicles	1	1	2	3	3	2	2	2
Other Mobile	24	28	33	38	41	36	25	21

Table 4-25

San Diego Air Basin
Ozone Precursor Emission Trends and Forecasts

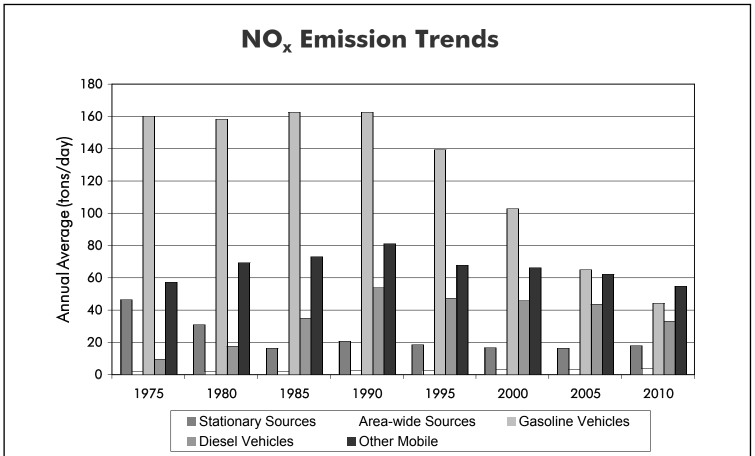

Figure 4-32

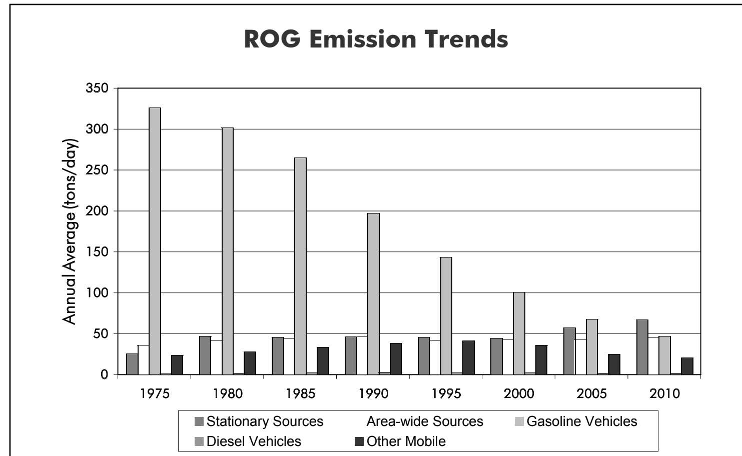

Figure 4-33

San Diego Air Basin

Ozone Air Quality Trend

Both the peak indicator and the number of days above the State and national ozone standards have decreased over the last 20 years. The peak 1-hour ozone indicator shows an overall decline of 42 percent from 1981 to 2000. The number of State and national 1-hour standard exceedance days has dropped even more. There were 192 State standard exceedance days during 1981 and 24 State standard exceedance days during 2000. This represents a decrease of about 88 percent. During 1981, there were 78 national 1-hour standard exceedance days. There were no national 1-hour standard exceedance days during 1999 or 2000. However, there were 16 national 8-hour standard exceedance days. It is clear that additional local emission controls will be needed to reach attainment of the ozone standards in the San Diego area. However, because of transport, future air quality in this area will also be affected by emission controls and growth in the South Coast Air Basin and, to some extent, Mexico.

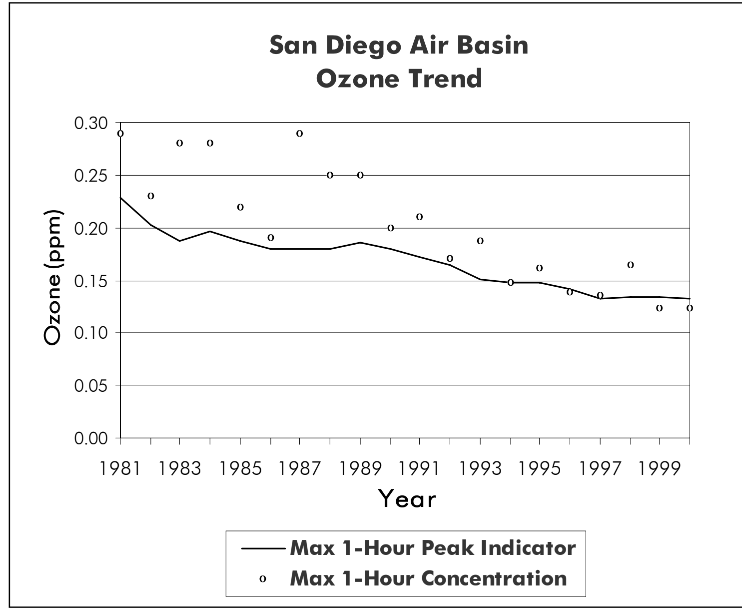

Figure 4-34

San Diego Air Basin

Ozone Air Quality Table

OZONE (ppm)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Peak 1-Hour Indicator	0.228	0.203	0.188	0.197	0.188	0.179	0.179	0.179	0.186	0.180	0.172	0.164	0.150	0.147	0.148	0.142	0.132	0.134	0.134	0.132
National 1-Hr. Design Value	0.290	0.210	0.200	0.200	0.210	0.190	0.180	0.180	0.190	0.190	0.170	0.170	0.154	0.150	0.146	0.141	0.138	0.135	0.135	0.131
Nat. 8-Hr. Design Value	0.141	0.137	0.130	0.126	0.132	0.125	0.124	0.121	0.125	0.129	0.125	0.118	0.112	0.109	0.108	0.104	0.099	0.102	0.099	0.100
Maximum 1-Hr. Concentration	0.290	0.230	0.280	0.280	0.220	0.190	0.290	0.250	0.250	0.200	0.210	0.170	0.187	0.147	0.162	0.138	0.136	0.164	0.124	0.124
Max. 8-Hr. Concentration	0.206	0.162	0.176	0.207	0.168	0.143	0.196	0.156	0.193	0.145	0.145	0.133	0.154	0.121	0.122	0.117	0.112	0.141	0.100	0.106
Days Above State Standard	192	120	125	146	148	131	127	160	159	139	106	97	90	79	96	51	43	54	27	24
Days Above Nat. 1-Hr. Std.	78	47	61	51	50	42	40	45	56	39	27	19	14	9	12	2	1	9	0	0
Days Above Nat. 8-Hr. Std.	133	83	101	98	109	81	99	119	122	96	67	66	58	46	48	31	16	35	16	16

Table 4-26

San Diego Air Basin

PM_{10} Emission Trends and Forecasts

Direct emissions of PM_{10} are doubling in the San Diego Air Basin between 1975 and 2010. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, dust from construction and demolition operations, and particulates from residential fuel combustion (including wood). The growth in these area-wide sources is primarily due to population growth and increases in vehicle miles traveled (VMT).

PM_{10} Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***71***	***84***	***90***	***113***	***112***	***120***	***131***	***140***
Stationary Sources	17	12	5	7	8	8	6	7
Area-wide Sources	45	63	74	92	92	101	113	122
On-Road Mobile	3	3	4	5	5	5	5	5
Gasoline Vehicles	2	2	2	3	3	3	4	4
Diesel Vehicles	1	1	2	3	2	1	1	1
Other Mobile	6	7	7	8	7	7	7	6

Table 4-27

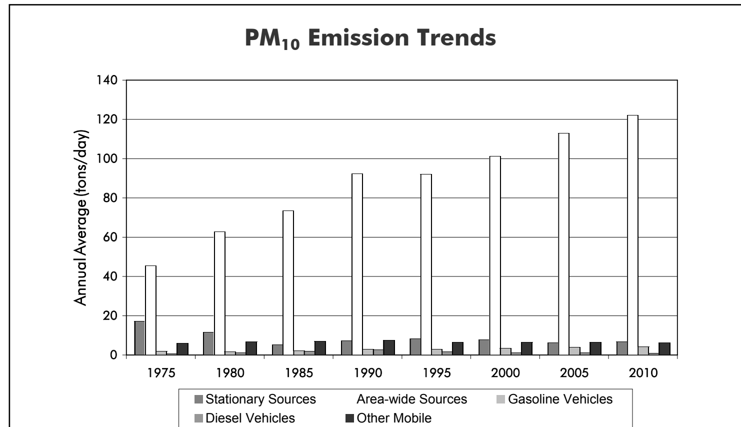

Figure 4-35

San Diego Air Basin

PM_{10} Air Quality Trend

PM_{10} concentrations in the San Diego Air Basin have changed little during the years for which reliable data are available. The maximum annual geometric mean for 2000 exceeds the State annual standard and is not much lower than it was during 1988. This apparent lack of progress is a result of monitoring that began at a new site, with higher concentrations, during 1993. The 24-hour concentrations also exceed the State standard. During 2000, the maximum 24-hour concentration was 139 µg/m³. During 1988, there were 87 calculated State standard exceedance days, compared with 111 during 2000. Again, this apparent increase is attributable to the new site that began operating in 1993. There is a substantial amount of variability from year-to-year in the 24-hour statistics. This variability is a reflection of meteorology, the 1-in-6-day sampling schedule, and changes in monitoring location. Although ambient PM_{10} concentrations in the San Diego Air Basin are not as high as in some other areas of the State, additional emission controls will be needed to bring this area into attainment.

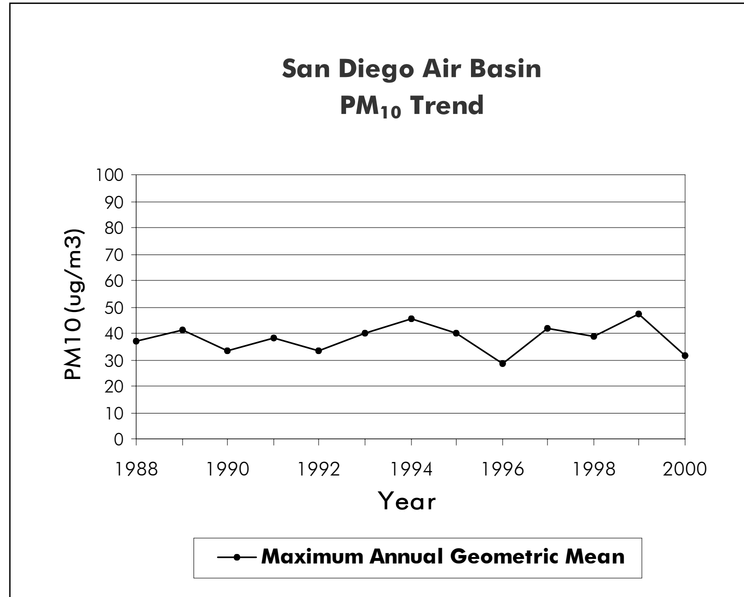

Figure 4-36

San Diego Air Basin

PM_{10} Air Quality Table

PM_{10} (ug/m3)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Max. 24-Hour Concentration								81	90	115	81	67	159	129	121	93	125	89	121	139
Max. Annual Geometric Mean								36.8	41.3	33.4	38.0		40.0	45.2	39.8	28.4	41.9	38.6	47.5	31.6
Calc Days Above State 24-Hr Std								87	111	42	81	36	132	129	114	90	126	108	126	111
Calc Days Above Nat 24-Hr Std								0	0	0	0	0	6	0	0	0	0	0	0	0

Table 4-28

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San Diego Air Basin

Carbon Monoxide Emission Trends and Forecasts

CO emissions in the San Diego Air Basin follow the statewide trend of decreasing from 1985 to 2010, even though the motor vehicle miles traveled (VMT) are increasing. This is yet another example of how California's motor vehicle control program is having a positive impact on CO emissions.

CO Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***3076***	***2956***	***2861***	***2468***	***1809***	***1382***	***1020***	***799***
Stationary Sources	20	21	21	25	25	40	37	39
Area-wide Sources	48	50	56	60	64	67	74	80
On-Road Mobile	2866	2704	2567	2123	1473	1048	692	472
Gasoline Vehicles	2863	2699	2557	2109	1461	1038	682	465
Diesel Vehicles	3	5	10	14	12	10	9	8
Other Mobile	142	181	217	260	248	227	217	208

Table 4-29

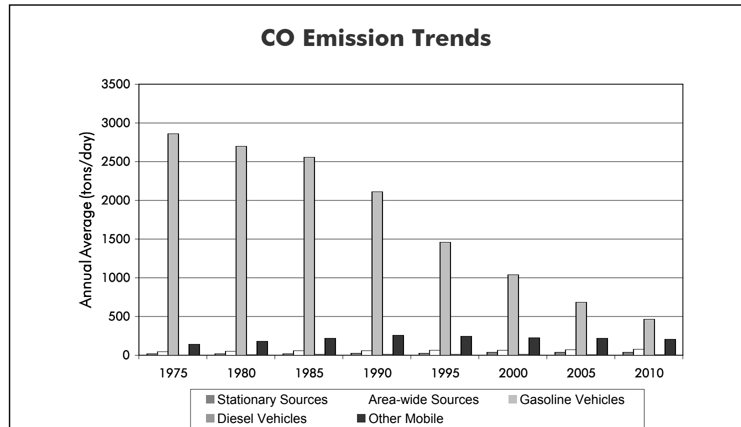

Figure 4-37

San Diego Air Basin
Carbon Monoxide Air Quality Trend

Peak 8-hour carbon monoxide concentrations in the San Diego Air Basin decreased substantially over the trend period -- a 56 percent decrease from 1981 to 2000. As a result of these decreases, the national CO standards have not been exceeded in the San Diego Air Basin since 1989. The last exceedance of the State standards occurred during 1990.

With existing and anticipated motor vehicle and clean fuels regulations, ambient CO concentrations should continue to decline. This should be sufficient to maintain a healthful level of carbon monoxide in this area.

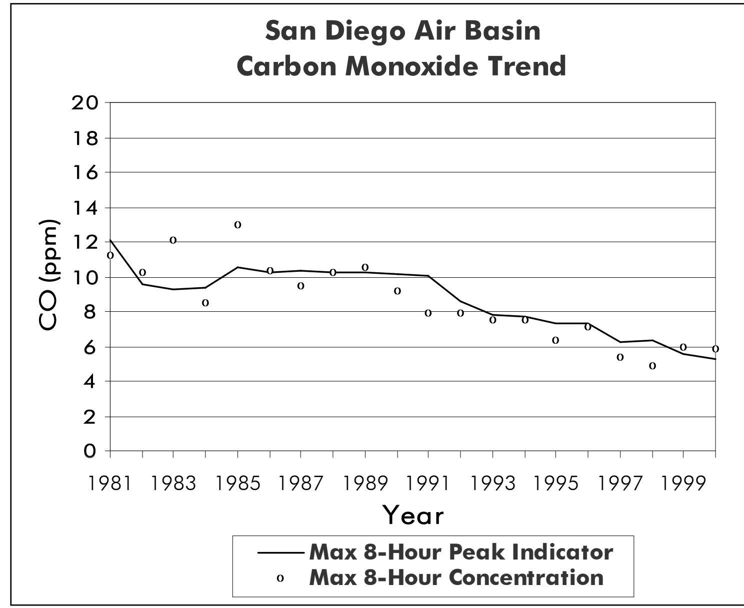

Figure 4-38

San Diego Air Basin

Carbon Monoxide Air Quality Table

CARBON MONOXIDE (ppm)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Peak 8-Hr. Indicator	12.1	9.5	9.3	9.4	10.6	10.2	10.4	10.2	10.3	10.2	10.0	8.6	7.8	7.7	7.3	7.3	6.3	6.3	5.6	5.3
Max. 1-Hr. Concentration	15.0	15.0	16.0	16.0	17.0	16.0	14.0	17.0	17.0	18.0	14.0	14.0	11.4	11.0	9.9	12.4	9.3	10.2	9.9	9.3
Max. 8-Hr. Concentration	11.3	10.3	12.1	8.5	13.0	10.4	9.4	10.3	10.5	9.1	7.9	7.9	7.5	7.5	6.3	7.1	5.4	4.8	6.0	5.9
Days Above State 8-Hr. Std.	1	1	1	0	5	2	1	5	6	1	0	0	0	0	0	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	1	1	1	0	3	1	0	2	5	0	0	0	0	0	0	0	0	0	0	0

Table 4-30

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San Diego Air Basin
Oxides of Nitrogen Emission Trends and Forecasts

NO_x (and nitrogen dioxide) emissions in the San Diego Air Basin follow the statewide trend of declining from 1990 to 2010. The continued adoption of more stringent motor vehicle and stationary source emission standards should continue to reduce nitrogen dioxide emissions.

NO_x Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***275***	***278***	***289***	***321***	***276***	***235***	***191***	***154***
Stationary Sources	46	31	17	21	19	17	16	18
Area-wide Sources	2	2	2	3	3	3	3	4
On-Road Mobile	170	176	198	216	187	149	109	77
Gasoline Vehicles	160	158	162	162	139	103	65	44
Diesel Vehicles	10	18	35	54	47	46	44	33
Other Mobile	57	69	73	81	68	66	62	55

Table 4-31

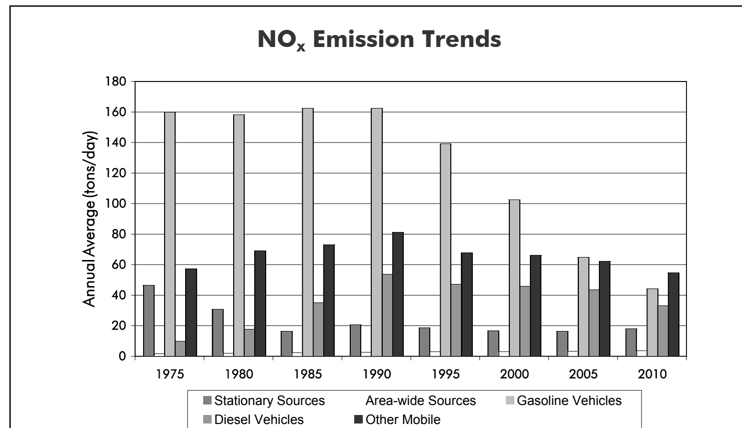

Figure 4-39

San Diego Air Basin

Nitrogen Dioxide Air Quality Trend

In the past, the San Diego Air Basin had a nitrogen dioxide problem. Maximum 1-hour concentrations during the 1980s occasionally exceeded the ambient air quality standards. However, ambient concentrations are now well below the levels of both the State and national standards. Data show that the maximum peak 1-hour indicator decreased 52 percent from 1981 to 2000, and the San Diego Air Basin is in attainment for the nitrogen dioxide standards.

Because oxides of nitrogen (NO_x) emissions contribute to ozone, as well as to nitrogen dioxide, many of the ozone control measures help reduce ambient NO_2 concentrations. Furthermore, NO_x emission controls are a critical part of the ozone control strategy and are not expected to be relaxed in the future. As a result, these controls should assure continued attainment of the State and national nitrogen dioxide standards.

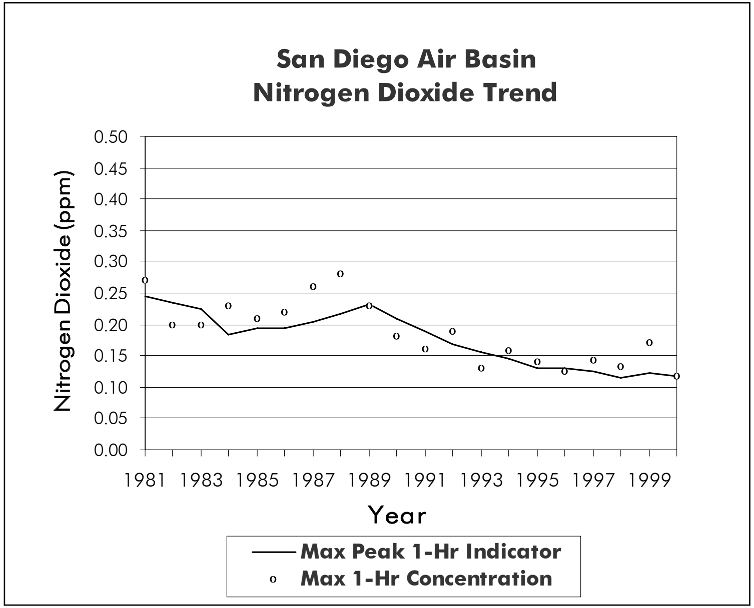

Figure 4-40

San Diego Air Basin

Nitrogen Dioxide Air Quality Table

NITROGEN DIOXIDE (ppm)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Peak 1-Hr. Indicator	0.245	0.233	0.225	0.183	0.193	0.193	0.203	0.216	0.233	0.210	0.189	0.169	0.155	0.145	0.129	0.129	0.126	0.116	0.122	0.117
Max. 1-Hr. Concentration	0.270	0.200	0.200	0.230	0.210	0.220	0.260	0.280	0.230	0.180	0.160	0.190	0.130	0.157	0.140	0.124	0.142	0.132	0.172	0.117
Max. Annual Average	0.024	0.030	0.027	0.031	0.032	0.030	0.032	0.035	0.031	0.029	0.029	0.027	0.023	0.024	0.026	0.022	0.024	0.023	0.026	0.024

Table 4-32

Sacramento Valley Air Basin

Introduction - Area Description

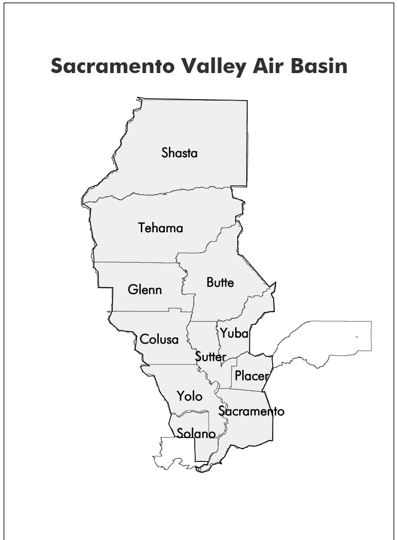

Figure 4-41

The Sacramento Valley Air Basin is home to California's capital. Located in the northern portion of the Central Valley, the Sacramento Valley Air Basin includes Butte, Colusa, Glenn, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba counties, the western urbanized portion of Placer County, and the eastern portion of Solano County. The Sacramento Valley Air Basin occupies 15,043 square miles and has a population of more than two million people. Because of its inland location, the climate of the Sacramento Valley Air Basin is more extreme than the climate in the San Francisco Bay Area Air Basin or South Coast Air Basin. The winters are generally cool and wet, while the summers are hot and dry.

Emissions from the Sacramento metropolitan area dominate the emission inventory for the Sacramento Valley Air Basin, and on-road motor vehicles are the primary source of emissions in the metropolitan area. While pollutant concentrations have generally declined over the years, additional regulations will be needed to attain the State and national ambient air quality standards in this air basin.

Sacramento Valley Air Basin

Emission Trends and Forecasts

The emission levels in the Sacramento Valley Air Basin are trending downward from 1980 to 2010 for NO_x and ROG, and downward from 1975 to 2010 for CO. The decreases in NO_x, ROG, and CO are largely due to motor vehicle controls and reductions in evaporative emissions. Mobile sources (both on-road and other) are by far the largest contributors to NO_x, ROG, and CO emissions in the Sacramento Valley Air Basin. PM_{10} emissions are increasing from 1995 to 2010.

Sacramento Valley Air Basin

Population and VMT

Between 1981 and 2000, population in the Sacramento Valley Air Basin grew at a higher rate than the statewide average -- a 51 percent increase compared with a 39 percent increase statewide. Meanwhile, during this same period, the increase in the number of vehicle miles traveled each day was about the same as the overall statewide value -- a 95 percent increase in the Sacramento Valley Air Basin compared with a 91 percent increase statewide. While the actual population and VMT totals for the Sacramento Valley Air Basin are much smaller than those for the South Coast Air Basin and San Francisco Bay Area Air Basin, they are important because motor vehicles are a significant source of emissions in the Sacramento Valley Air Basin.

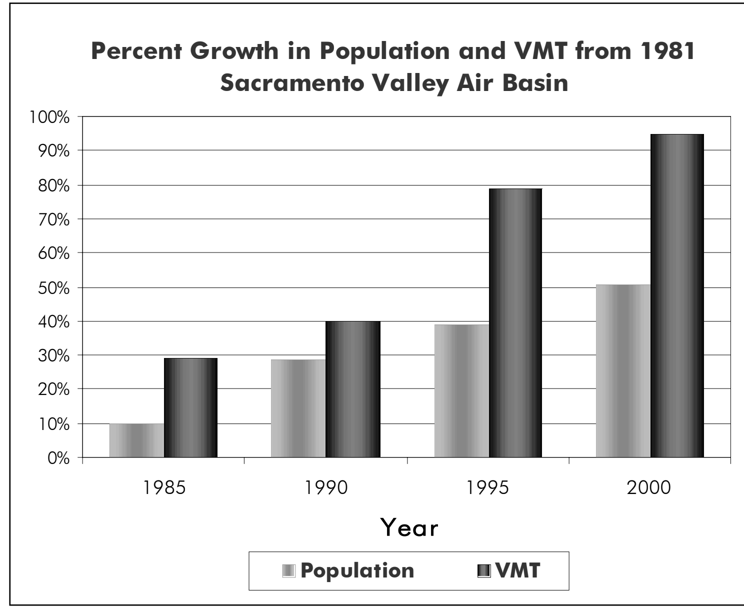

Figure 4-42

Sacramento Valley Air Basin
Ozone Precursor Emission Trends and Forecasts

Emissions of NO_x show a steady decrease from 1990 to 2010. On-road motor vehicles and other mobile sources are by far the largest contributors to NO_x emissions. More stringent mobile source emission standards and cleaner burning fuels have largely contributed to the decline in NO_x emissions. ROG emissions have been decreasing for the last 20 years due to more stringent motor vehicle standards and new rules for control of ROG from various industrial coating and solvent operations.

NO_x Emission Trends (tons/day, annual average)

Emission Source	1975	1980	1985	1990	1995	2000	2005	2010
All Sources	***312***	***360***	***340***	***361***	***315***	***275***	***229***	***184***
Stationary Sources	26	25	18	29	33	27	32	34
Area-wide Sources	4	5	5	6	7	7	8	9
On-Road Mobile	164	189	205	216	184	153	113	79
Gasoline Vehicles	137	149	147	137	120	90	61	42
Diesel Vehicles	27	40	59	79	64	63	52	37
Other Mobile	**118**	**142**	**111**	**110**	**92**	**88**	**76**	**62**

Table 4-33

ROG Emission Trends (tons/day, annual average)

Emission Source	1975	1980	1985	1990	1995	2000	2005	2010
All Sources	***413***	***437***	***407***	***358***	***311***	***268***	***232***	***213***
Stationary Sources	59	61	62	53	51	50	51	56
Area-wide Sources	66	76	68	76	69	71	73	78
On-Road Mobile	260	264	240	185	142	104	74	51
Gasoline Vehicles	258	261	236	181	139	101	72	50
Diesel Vehicles	2	3	4	4	3	3	2	2
Other Mobile	28	36	38	43	48	44	33	27

Table 4-34

Sacramento Valley Air Basin
Ozone Precursor Emission Trends and Forecasts

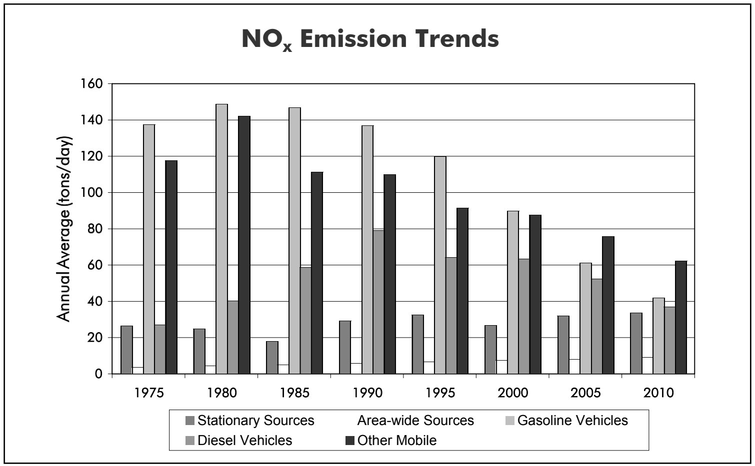

Figure 4-43

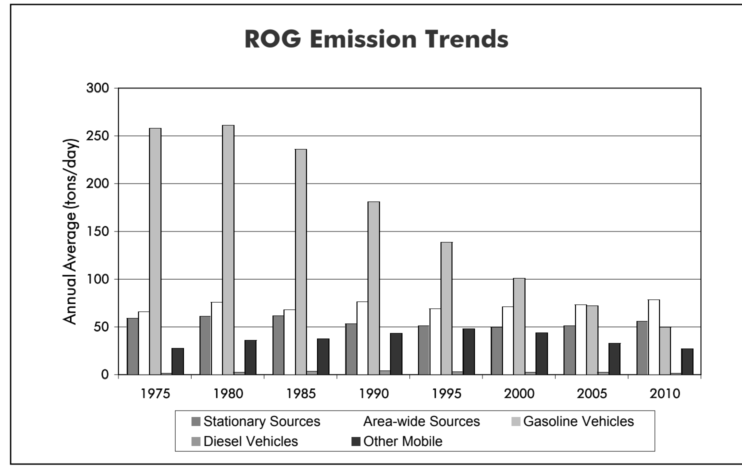

Figure 4-44

Sacramento Valley Air Basin

Ozone Air Quality Trend

Peak ozone values in the Sacramento Valley Air Basin have not declined as quickly over the last several years as they have in other urban areas. The maximum peak 1-hour values remained fairly constant during the 1980s. Since 1988, the peak values have decreased slightly, and the overall decline for the 20-year period is about 15 percent. Looking at the number of days above the State and national standards, the trend is much more variable. However, the number of exceedance days has declined since 1988. The maximum measured 1-hour concentrations have also decreased, but at a lower overall rate. The maximum 1-hour concentration during 2000 was 0.14 ppm. Based on the data, it is apparent that additional emission controls will be needed to bring the area into attainment for the State and national ozone standards.

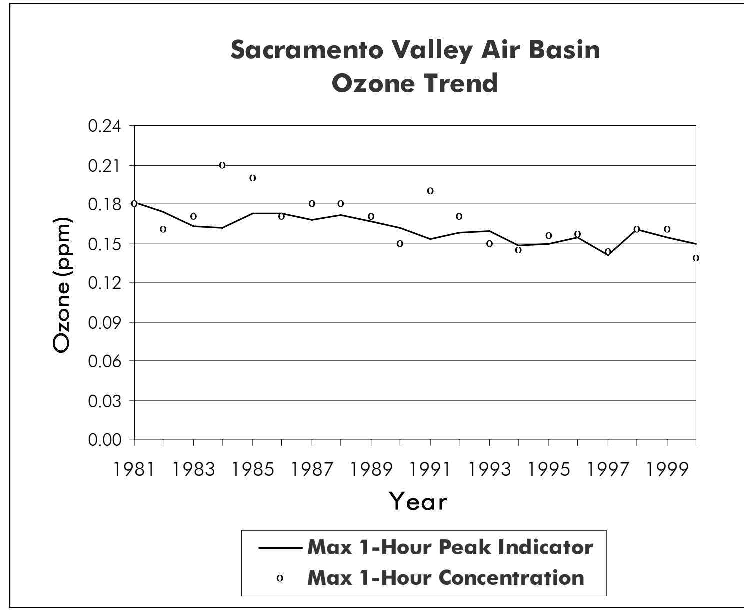

Figure 4-45

Sacramento Valley Air Basin
Ozone Air Quality Table

OZONE (ppm)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Peak 1-Hour Indicator	0.181	0.174	0.163	0.162	0.173	0.173	0.168	0.171	0.166	0.162	0.153	0.158	0.159	0.148	0.149	0.154	0.141	0.161	0.154	0.153
National 1-Hr. Design Value	0.170	0.160	0.160	0.180	0.180	0.180	0.160	0.160	0.160	0.160	0.150	0.150	0.150	0.143	0.145	0.145	0.133	0.148	0.148	0.148
Nat. 8-Hr. Design Value	0.115	0.112	0.114	0.115	0.118	0.118	0.114	0.114	0.114	0.107	0.105	0.105	0.110	0.104	0.106	0.106	0.097	0.097	0.101	0.105
Maximum 1-Hr. Concentration	0.180	0.160	0.170	0.210	0.200	0.170	0.180	0.180	0.170	0.150	0.190	0.170	0.150	0.145	0.156	0.157	0.143	0.160	0.160	0.138
Max. 8-Hr. Concentration	0.142	0.133	0.125	0.138	0.161	0.125	0.127	0.130	0.133	0.127	0.140	0.122	0.120	0.121	0.128	0.126	0.107	0.137	0.129	0.108
Days Above State Standard	78	66	62	64	59	66	94	98	68	50	68	74	34	60	50	58	25	62	59	42
Days Above Nat. 1-Hr. Std.	22	17	15	23	19	24	24	35	8	16	14	14	7	9	11	9	3	14	7	5
Days Above Nat. 8-Hr. Std.	63	46	44	46	42	50	73	68	37	44	60	56	22	48	40	44	15	60	43	35

Table 4-35

Sacramento Valley Air Basin

PM_{10} Emission Trends and Forecasts

Direct emissions of PM_{10} are increasing in the Sacramento Valley Air Basin between 1995 and 2010. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust from paved and unpaved roads, fugitive dust from construction and demolition, and particulates from residential fuel combustion. As also observed in other areas of the State, these area-wide PM_{10} emissions have gone up as a result of population growth and increased vehicle travel. Emissions of directly emitted PM_{10} from mobile sources and stationary sources in the Sacramento Valley Air Basin have remained relatively steady.

PM10 Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	***218***	***236***	***215***	***246***	***240***	***253***	***275***	***297***
Stationary Sources	22	16	14	16	15	15	16	17
Area-wide Sources	186	209	191	217	216	229	249	270
On-Road Mobile	3	3	4	5	4	4	4	4
Gasoline Vehicles	1	1	2	2	2	3	3	3
Diesel Vehicles	1	2	3	4	2	2	1	1
Other Mobile	7	8	7	7	6	6	6	5

Table 4-36

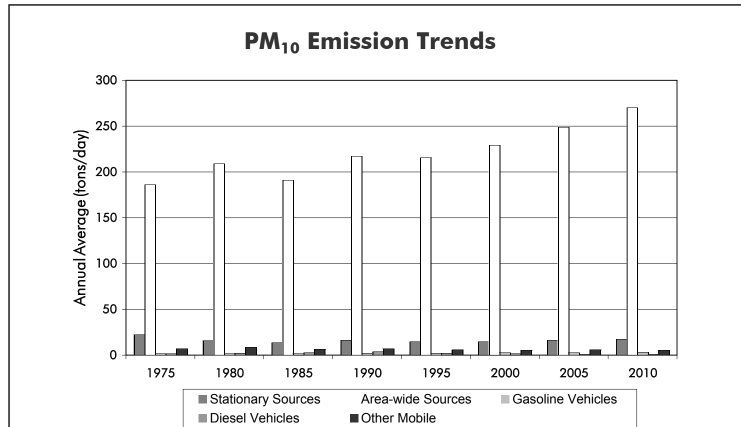

Figure 4-46

Sacramento Valley Air Basin

PM_{10} Air Quality Trend

The maximum annual geometric mean PM_{10} concentrations in the Sacramento Valley Air Basin show a fairly steady decline over the trend period. The maximum annual geometric mean shows a decrease of about 33 percent from 1988 to 2000, when the value was below the level of the State annual standard. The number of exceedance days also decreased. During 1988, there were 120 calculated exceedance days of the State 24-hour standard, compared with 45 days during 2000. Because many of the sources that contribute to ozone also contribute to PM_{10}, future ozone emission controls should improve PM_{10} air quality.

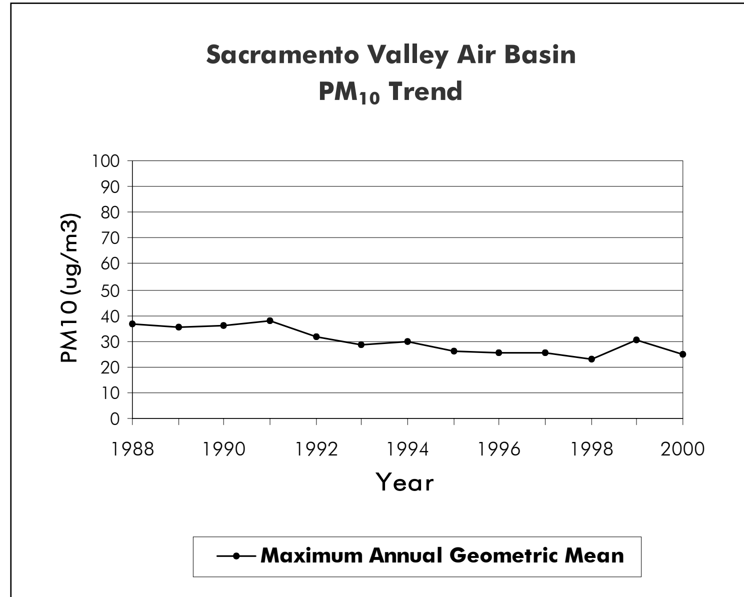

Figure 4-47

Sacramento Valley Air Basin

PM_{10} Air Quality Table

PM_{10} (ug/m3)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Max. 24-Hour Concentration								115	139	153	136	111	110	154	145	98	126	130	179	86
Max. Annual Geometric Mean								36.7	35.5	36.0	37.7	31.4	28.8	30.0	26.3	25.5	25.3	22.8	30.3	24.7
Calc Days Above State 24-Hr Std								120	84	93	114	96	60	36	66	42	24	60	66	45
Calc Days Above Nat 24-Hr Std								0	0	0	0	0	0	0	0	0	0	0	6	0

Table 4-37

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Sacramento Valley Air Basin

Carbon Monoxide Emission Trends and Forecasts

Emissions of CO are declining in the Sacramento Valley Air Basin between 1980 and 2010. Motor vehicles are the largest source of CO emissions. With the introduction of new automotive emission controls to meet more stringent emission standards, motor vehicle CO emissions have been declining since 1980, despite increases in vehicle miles traveled (VMT). Stationary and area-wide source CO emissions have remained relatively steady, with additional emission controls offsetting growth.

CO Emission Trends (tons/day, annual average)								
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
All Sources	**2865**	**2968**	**2898**	**2612**	**2028**	**1637**	**1348**	**1149**
Stationary Sources	25	25	12	45	34	33	38	41
Area-wide Sources	436	402	426	429	394	370	394	422
On-Road Mobile	2234	2321	2233	1868	1335	984	677	460
Gasoline Vehicles	2228	2310	2217	1849	1320	972	667	452
Diesel Vehicles	7	10	15	19	15	12	10	8
Other Mobile	170	220	227	269	266	250	239	227

Table 4-38

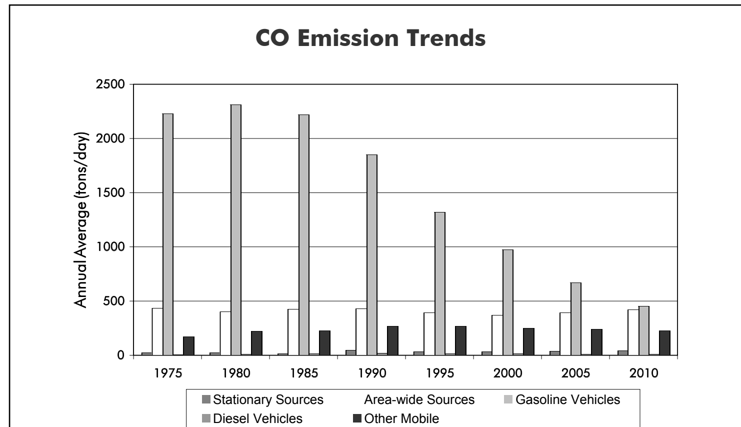

Figure 4-48

Sacramento Valley Air Basin

Carbon Monoxide Air Quality Trend

The maximum peak 8-hour carbon monoxide trend for the Sacramento Valley Air Basin was relatively flat from 1981 to 1991, with some year-to-year variability that was probably caused by meteorology. Since 1991, concentrations have decreased substantially. The 2000 value was about 53 percent lower than the 1991 value. The number of days above the State and national standards is even more variable. However, these indicators also show an overall downward trend. The national CO standards have not been exceeded since 1991, and the State standards were last exceeded in 1993. Much of the decline in ambient carbon monoxide concentrations is attributable to the introduction of cleaner fuels and newer, cleaner motor vehicles. These controls will help keep the area in attainment for both the State and national CO standards.

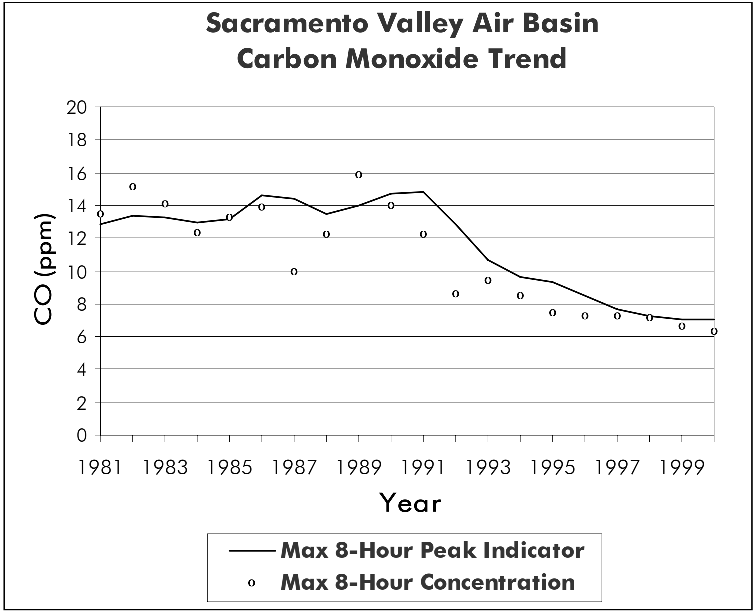

Figure 4-49

Sacramento Valley Air Basin

Carbon Monoxide Air Quality Table

CARBON MONOXIDE (ppm)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Peak 8-Hr. Indicator	12.9	13.4	13.2	13.0	13.2	14.6	14.4	13.4	14.0	14.7	14.8	12.9	10.7	9.6	9.3	8.5	7.7	7.3	7.0	7.0
Max. 1-Hr. Concentration	17.0	17.0	19.0	18.0	17.0	20.0	15.0	17.0	18.0	17.0	15.0	14.0	12.0	10.8	9.8	8.7	9.5	7.9	7.7	10.0
Max. 8-Hr. Concentration	13.5	15.1	14.1	12.4	13.3	13.9	10.0	12.3	15.9	14.0	12.3	8.6	9.4	8.4	7.4	7.2	7.2	7.1	6.6	6.3
Days Above State 8-Hr. Std.	7	11	6	6	12	13	5	12	22	14	9	0	2	0	0	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	7	9	4	5	12	12	3	9	22	12	6	0	0	0	0	0	0	0	0	0

Table 4-39